#### WASHINGTON NATIONAL GUARD LIMITED SITE CHARACTERIZATION DRAFT REPORT TOPPENISH FACILITY TOPPENISH, WASHINGTON

September 1992

Prepared for:

Washington State National Guard Tacoma, Washington

Project 626121

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#### 1 <u>INTRODUCTION</u>

This Limited Site Characterization Report has been prepared to address an underground storage tank (UST) release at the Washington National Guard (WNG) facility located at 326 Division Street in Toppenish, Washington. The location of the site is shown in Figure 1. The release consisted of an unknown quantity of heating oil that was stored in a 500 gallon steel UST on site.

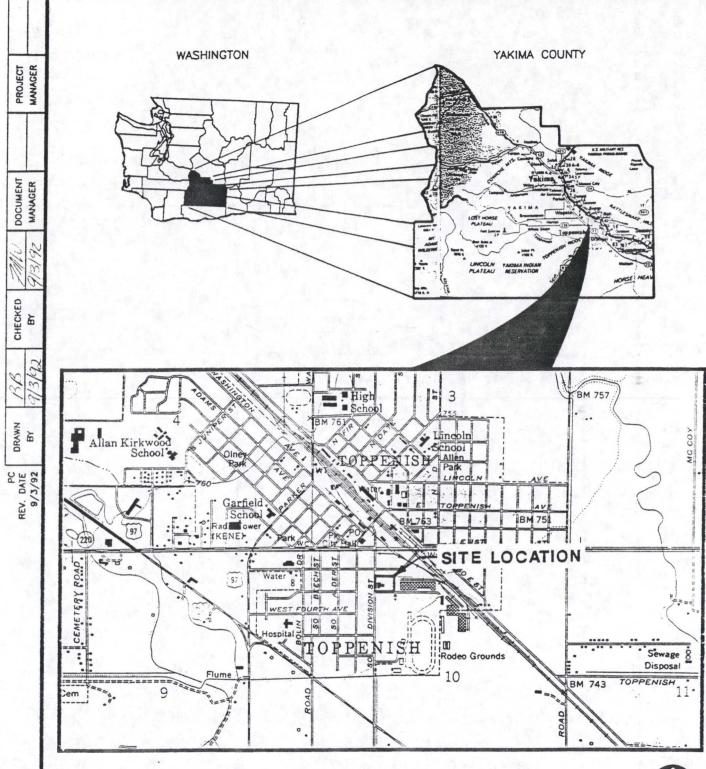
#### 1.1 Purpose

The purpose of this study is to assess the extent of the contamination resulting from the heating oil leak, estimate the extent of free hydrocarbon product and identify the potential for impacts to area groundwater. Recommendations for additional investigative actions and remedial measures are included under separate cover titled Proposed Additional Site Characterization and Interim Product Recovery Measures, Washington National Guard Facility, Toppenish, Washington.

#### 1.2 Background

In April 1992, the National Guard contacted Burlington Environmental Inc. (Burlington Environmental) to remove five USTs from the Toppenish facility. The excavated areas and former tank locations are shown in Figure 2. During UST removal, discolored soils were encountered adjacent to Tank No. T2-E and extended to Tank T2-C (see Figure 2). One sample from these soils adjacent to Tank No. T2-E and one sample from under Tank No. T2-C were obtained. The samples were analyzed for total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, total xylenes (BTEX), and priority pollutant metals (PPM). Only TPH (diesel-range) was detected above detection limits at 5,900 parts per million (ppm) and 2,600 ppm, at Tanks T2-E and T2-C, respectively. WNG informed Burlington Environmental 9/92/b39:1780.rpt(6121)

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SCALE IS VARIABLE



Burlington Environmental Inc.

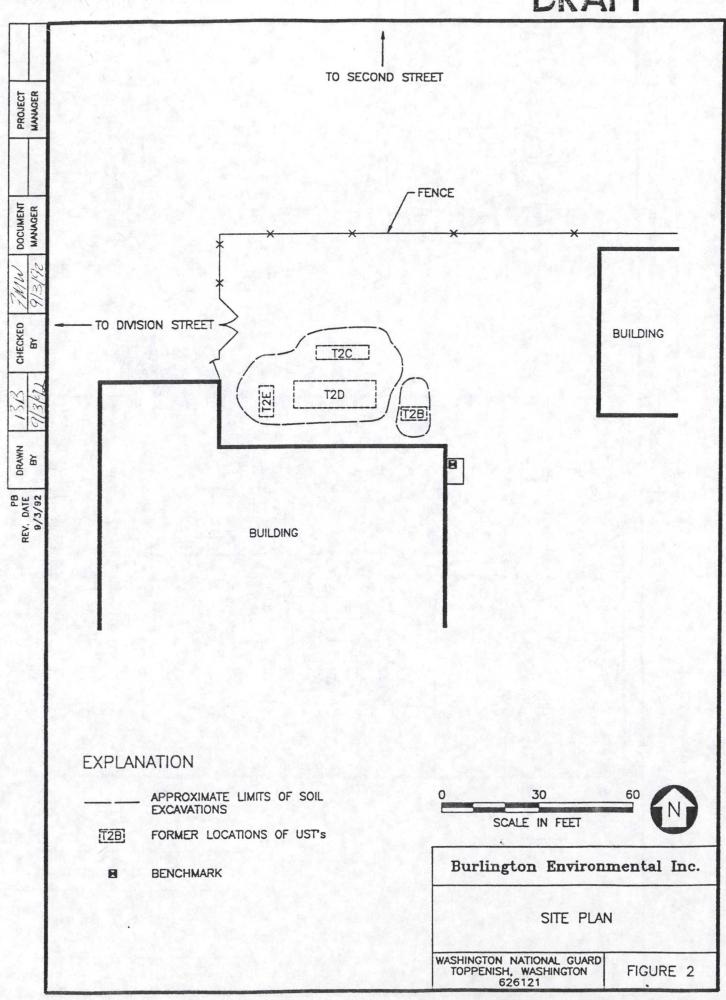
SITE LOCATION MAP

Modified from U.S. Geological Survey, Hembre Mountain, and Toppenish, Washington quadrangle photorevised 1985.

WASHINGTON NATIONAL GUARD TOPPENISH, WASHINGTON 626121

FIGURE 1

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that Tank No. T2-E (500-gallon capacity) was used for heating oil storage and Tank No. T2-C (3000-gallon capacity) was used for unleaded fuel storage. After removal, the tanks were visually inspected. Tank No. T2-E was observed to have a hole approximately ¾-inch in diameter on one end of the tank.

In order to remove all impacted soil above the groundwater (approximately 11 feet below the existing grade), 250 cubic yards of soil were excavated and removed from the site. Soil samples from the excavation sidewalls were analyzed for TPH. Contamination was not detected. However, an oil sheen was noted on the groundwater surface.

#### 1.3 Regulatory Setting

Since the facility is located on Indian land, a release from a UST is regulated by the U.S. Environmental Protection Agency (USEPA). The Washington State Department of Ecology (Ecology) and USEPA were notified of the release on May 20, 1992. USEPA subsequently directed WNG and Burlington Environmental to adhere to the Ecology requirements and procedures. Therefore, this investigation was conducted as an independent remedial action in accordance to the Washington State Model Toxics Control Act (MTCA), WAC 173-340. The USEPA was consulted by Burlington Environmental so that the planning and execution of this investigation met their approval.

#### 2 SITE CHARACTERIZATION

#### 2.1 Regional Geology and Hydrology

The site is located within the eastern portion of Toppenish Creek Basin (TC Basin) in South-Central Washington (see Figure 3). The TC Basin is bounded by the Toppenish ridge to the south, the Cascade Range to the west, and the Ahtanum Ridge to the north and east. The basin comprises a drainage area of approximately 627 square miles, and ranges in elevation from 5100 feet at the western drainage divide to 750 feet on the eastern valley floor along the Yakima River.

The TC Basin contains four principal hydrostratigraphic units: 1) deep basalt, 2) primary basalt, 3) confined old valley fill and basalt, and 4) young valley fill (Skrivan, 1987). The deep and primary basalt units are a layered sequence that has a minimum thickness of 2000 feet and underlies the entire TC Basin. The old valley fill consists of partially consolidated gravels, sands, silts and clays of the Ellensburg formation of Miocene Age. This unit is thought to attain a maximum thickness of 1000 feet in the east-central part of the TC basin. The young valley fill unit is confined to the eastern third of the TC Basin. This unit, which includes recent alluvium and the upper part of the Ellensburg formation, consists of gravel, cemented gravel, sand and silt, and attains a maximum thickness of 500 feet west of Toppenish in the Wapato area.

#### 2.2 Site Geology and Hydrology

The upper stratigraphic unit at the site consists of unconsolidated gravels, sands and silts with minor clay. These recent alluvial sediments comprise the upper part of the young valley aquifer.

FIGURE 3. Toppenish Creek Basin - Generalized Areal Geology (From U.S. Geological Survey, 1975)

Groundwater at the site occurs at a depth of approximately 11 feet below grade in the seven monitoring wells installed. Relative groundwater elevations measured in these wells indicate a south to southeast groundwater flow direction across the site with an average gradient of .001 feet/feet.

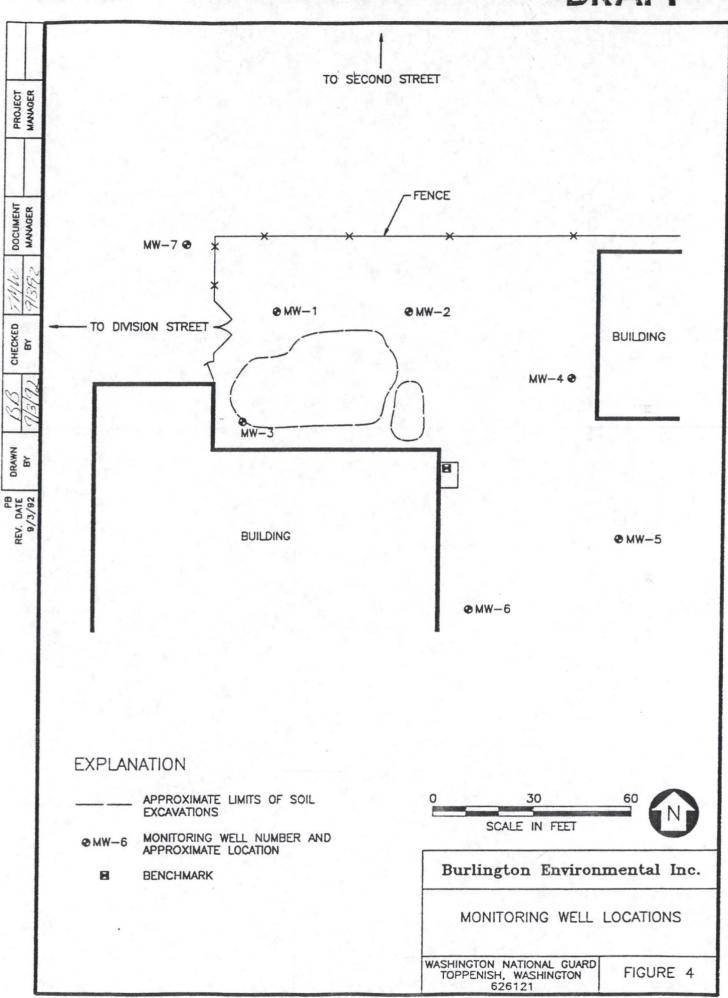
#### 2.3 Subsurface Exploration

#### 2.3.1 Drilling and Soil Sampling

Seven monitoring wells were installed on the site at the locations shown in Figure 4. All drilling was completed with a Dietrich D-50 drill rig using 4¼-inch inside-diameter hollow-stem augers. A Burlington Environmental field geologist logged the borings and classified the soil samples in accordance with American Standard Testing Method (ASTM) D-2488-84, "Standard Practice for Description and Identification of Soils" (Visual-Manual Method). The detailed boring logs are presented in Appendix A. Wells MW-1, MW-2 and MW-3 were installed at the proposed locations indicated in the original Field Sampling and Analysis Plan. After installation, each well was checked for the presence of light non-aqueous phase liquid (LNAPL). Due to the presence of LNAPL or a hydrocarbon sheen in all three wells, MW-4 was drilled farther downgradient than initially planned. An upgradient well (MW-7) and two additional downgradient wells (MW-5, MW-6) were approved by WNG at this time.

Soil samples were obtained from immediately above the water table in each well utilizing the approved techniques and equipment specified in the Standard Penetration Test (ASTM-1586-84) and Burlington Environmental standard operating procedures. The Standard Penetration Test (SPT) includes driving a two or three inch outside diameter split-barrel sampler ahead of

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the auger through undisturbed soils by dropping a 140-pound hammer falling a vertical distance of 30 inches. Typically, each sample was obtained by 18 to 24 inches of penetration and the number of blows for each six-inch increment recorded. The recorded blow counts are shown on the boring logs. Additional description of the drilling, sampling and well installation procedures are included in Appendix B.

A portion of each soil sample was collected in a laboratory-prepared sample jar for laboratory analysis. The remainder of the sample was used for visual classification and for field screening. The field screening consisted of examining each sample for the presence of organic vapors using a photoionization detector (PID). The field screening does not provide quantitative data. However, it is an effective tool in determining the relative level of contamination.

#### 2.3.2 Well Construction and Sampling

All monitoring wells were constructed using 2" diameter flush-threaded, schedule-40 PVC casing and well screens. The bottom 10 feet of each casing string consisted of factory-slotted (0.010-inch slots) well screen. Above the screen section, blank casing was installed to the top of the well at the ground surface. The screen length was chosen so that the presence of LNAPL could be detected in each monitoring well. Each well was completed with a filter pack consisting of 10-20 Colorado silica sand. All wells were installed with flush-mounted protective casings. Well completion information detailing the construction specifications of the seven monitoring wells is included in the Well Completion Reports, Appendix C.

Following the well construction, the wells were surveyed for location relative to each other and the surrounding buildings, and for elevation relative to an arbitrarily assigned bench mark. The bench mark was chosen on the northwest corner of the concrete pad approximately 45 feet north of well MW-6, and was assigned an elevation of 100.00 feet. The location of the

bench mark is shown on Figure 4. All other elevations noted on figures, tables and borings logs within this report are referenced relative to this bench mark.

After construction, each of the wells was checked for the presence of LNAPL using an electronic oil/water interface probe. LNAPL was detected in wells MW-1, MW-2 and MW-3. Well MW-3 had approximately 0.01 inches of LNAPL. Wells MW-1 and MW-2 had LNAPL accumulations estimated to be less than 0.01 inches thick (i.e. a hydrocarbon sheen).

Water levels were recorded in all wells at this time. The depth to water in each well was then corrected to relative elevation using the established on-site datum. A summary of ground water elevation and survey data is presented in Table 1. Contouring of the water elevations indicates a south to southeast groundwater flow direction at the time of measurement, with a gradient of 0.001. The interpreted groundwater surface contour map is shown in Figure 5.

Wells MW-4, -5, -6 and -7 were developed using a hand rod pump. Wells MW-1, MW-2 and MW-3 were not developed due the presence of LNAPL. Well development is a process of cleaning the well filter pack and screen to increase the efficiency of the well and to reduce the potential effects of drilling on the water chemistry. During the drilling process, clay and silt can smear along the walls of the borehole and reduce permeability in this area. Standard Burlington Environmental protocol dictates that a minimum of three well volumes be purged and field parameters (pH, temperature and conductivity) stabilize prior to sampling. For wells MW-5, MW-6 and MW-7, a volume of 35 gallons was developed in order to adequately prepare the wells for sampling. Well MW-7 required an additional 5 gallons to be purged due to the presence of excess turbidity in the water after three well volumes had been removed.

Groundwater samples were collected from wells MW-4, -5, -6 and -7 immediately following development and were submitted to the Sound Analytical Laboratories for analysis. The analytical parameters included TPH by Washington state Method WTPH-D, BTEX by USEPA Method 8020, total lead by USEPA Method 6010 or 7421, and dissolved lead by USEPA Method 7421. Samples collected for dissolved lead were field filtered through a 0.45 micron filter.

Table 1
SUMMARY OF SURVEY DATA AND GROUNDWATER ELEVATIONS

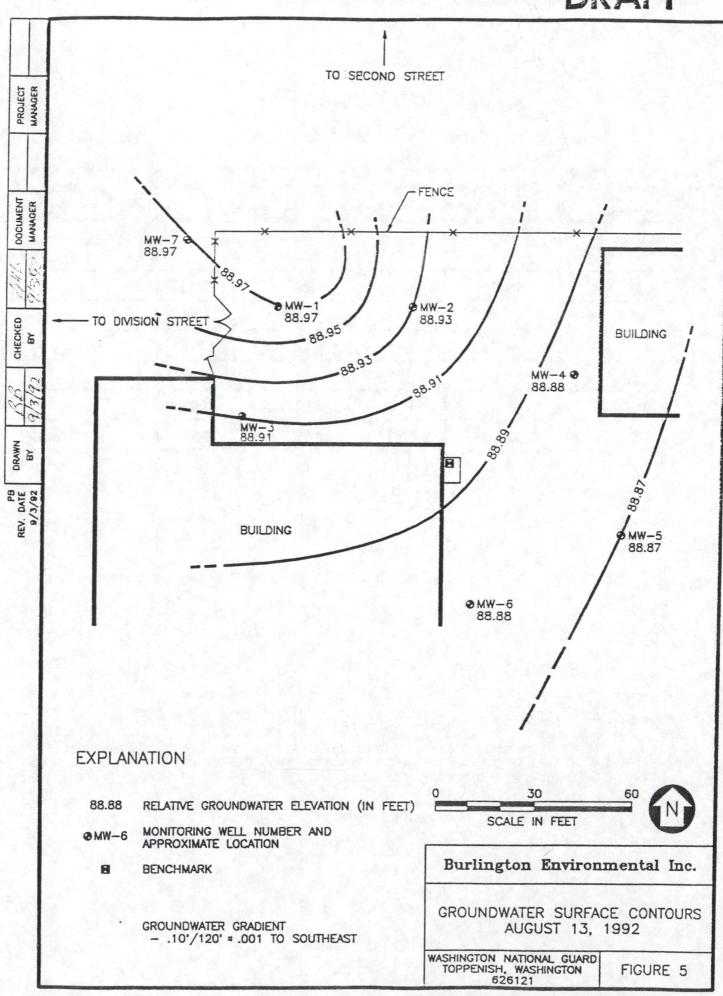
Monitoring Well No.	Top of Riser Elevation*	Depth to Water	Groundwater Elevation	Time**	Notes
MW-1	99.20	10.23	88.97	7:05	Free product (approximately .01 foot)
MW-2	99.21	10.23	88.93	7:10	Sheen, odor
MW-3	99.79	10.88	88.91	6:55	Sheen, odor
MW-4	98.73	9.85	88.38	7:18	
MW-5	98.63	9.76	88.87	7:20	-
MW-6	99.55	10.67	88.88	7:25	
MW-7	99.30	10.33	88.97	7:40	Odor

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<sup>\*</sup> Datum established on site at the concrete pad approximately 45 feet north of well MW-6. Assigned an arbitrary elevation of 100.00 feet.

<sup>\*\*</sup> All groundwater elevations recorded on 8/13/92.

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#### 2.3.3 Analytical Results

The results from the soil and groundwater sampling activities are presented below. In addition, the laboratory analytical report and an analytical data review are included in Appendices D and E, respectively. The Chain of Custody documentation is included in Appendix F.

#### 2.3.3.1 Soil

The soils encountered during drilling consisted of silts, sands and gravels. In general, the interval from the surface to a depth of five to eight feet was characterized by clayey to sandy silts and fine sands. Below this to the depth drilled, approximately 20 feet, soils consisted of fine to coarse gravel with sand and traces of silt. The boring logs included in Appendix A detail the specific stratigraphic variations encountered in each well.

Qualitative PID readings were obtained from cuttings on the auger flights and from the soil samples. The only positive PID readings were from well MW-3, with a maximum of 35 units from the augers at a depth of 16 feet. Visible contamination in the form of an oily coating was observed in the soil sample from MW-3. Laboratory analysis of this sample confirmed the presence of TPH in excess of the MTCA cleanup standard of 200 ppm. The TPH contamination in the soil sample from MW-3 likely results from heating oil which leaked from Tank T2-E and mounded on the groundwater surface. The presence of free hydrocarbon product in this well was subsequently confirmed using an oil/water interface probe.

The soil samples collected from MW-1, -2, -4, -5, -6 and -7 revealed limited qualitative or visual evidence of contamination. Analytical testing of soil samples from these wells indicated that TPH levels were below the MTCA cleanup standard of 200 ppm.

Soil samples collected from the monitoring wells were also analyzed for lead. All samples contained lead concentrations well below the MTCA cleanup standard of 250 ppm. A summary of the soil analytical results is presented in Tables 2 and 3.

#### 2.3.3.2 Groundwater

Groundwater was encountered in all seven of the borings completed on the site at an average depth of 11 feet below grade. LNAPL was detected in wells MW-1, MW-2 and MW-3. Thickness of the LNAPL was 0.01 feet or less in all three wells. No LNAPLs were detected in wells MW-4, -5, -6 or -7.

Groundwater samples were collected from MW-4, -5, -6 and -7 and analyzed for TPH, BTEX, total lead (unfiltered) and dissolved lead (filtered). TPH was below MTCA cleanup standards in wells MW-4, MW-6, and MW-7. A TPH level of 1.0 ppm, which equals the MTCA cleanup standard, was recorded for the water sample from MW-5. The results of the groundwater analyses are shown in Tables 4 through 7.

BTEX compounds at levels above the laboratory detection limits of 0.001 ppm were not recorded in any of the samples analyzed. The 0.001 ppm detection limit is well below the MTCA cleanup standard for benzene (0.005 ppm), toluene (0.040 ppm), ethylbenzene (0.030 ppm) and xylene (0.020 ppm).

Levels of dissolved lead were below the MTCA cleanup standard of 0.005 ppm in all filtered groundwater samples analyzed. Total lead levels from unfiltered samples ranged from 0.012 ppm (MW-7) to 0.290 ppm (MW-5). All of these unfiltered samples exceeded the MTCA groundwater standard of 0.005 ppm for lead. It is important to note that all unfiltered samples had residual turbidity. This turbidity consists of finely suspended particulate matter which may have contained quantities of lead sufficient to raise the total lead levels above cleanup standards. The relatively lower levels of lead recorded in water from MW-7 may result from the fact that this well was reportedly purged to lower turbidity levels than the other wells.

Table 2

TOTAL PETROLEUM HYDROCARBONS (TPH)
WASHINGTON STATE METHOD WTPH-D
SOIL SAMPLE RESULTS SUMMARY

				Sample I		
Monitoring Well	Date	Burlington I.D. No.	the state of the s		Bottom	TPH (mg/kg)
MW-1	8/11/92	MW1-S1	26374-13	9.5	11.5	12
MW-2	8/11/92	MW2-S1	26374-14	9.5	10.8	24
MW-3	8/11/92	MW3-S1	26374-15	10	11.5	9,900
MW-4	8/12/92	MW4-S1	26374-16	8.5	10.5	26
MW-5	8/12/92	MW5-S1	26374-17	8	10	57
MW-6	8/12/92	MW6-S1	26374-18	8.5	10.5	15
MW-7	8/12/92	MW7-S1	26374-19	9	11	29

Table 3

# TOTAL LEAD USEPA METHOD 6010 SOIL SAMPLE RESULTS SUMMARY

				Sample I	Depth (feet)	
Monitoring Well	Date	Burlington I.D. No.	Lab I.D. No.	Тор	Bottom	Lead (mg/kg
MW-1	8/11/92	MW1-S2	26374-20	9.5	11.5	11
MW-2	8/11/92	MW2-S2	26374-21	9.5	10.8	9.2
MW-3	8/11/92	MW3-S2	26374-22	9.5	11.5	7.4
MW-4	8/12/92	MW4-S2	26374-23	8.5	10.5	8.7
MW-5	8/12/92	MW5-S2	26374-24	8	10	9.0
MW-6	8/12/92	MW6-S2	26374-25	8.5	10.5	7.9
MW-7	8/12/92	MW7-S2	26374-26	9	- 11	8.7

TOTAL PETROLEUM HYDROCARBON (TPH)
WASHINGTON STATE METHOD WTPH-D
WATER SAMPLE RESULTS SUMMARY

Table 4

Monitoring Well	Date	Burlington I.D. No.	Lab I.D. No.	TPH (mg/kg)
MW-4	8/13/92	MW4-W1	26374-1	.79
MW-5	8/13/92	MW5-W1	26374-2	1.0
MW-6	8/13/92	MW6-W1	26374-3	.62
MW-7	8/13/92	MW7-W1	26374-4	.62

BENZENE, TOLUENE, ETHYLBENZENE, AND XYLENE (BTEX)
USEPA METHOD 8020

Table 5

#### WATER SAMPLE RESULTS SUMMARY

Monitoring Well	Date	Burlington I.D. No.	Lab I.D. No.	Benzene (mg/l)	Toluene (mg/ℓ)	Ethylbenzene (mg/ℓ)	Xylene mg/ℓ)
MW-4	8/13/92	MW4-W2A, B	26374-5	< 0.001	< 0.001	< 0.001	< 0.001
MW-5	8/13/92	MW5-W2A, B	26374-6	< 0.001	< 0.001	< 0.001	< 0.001
MW-6	8/13/92	MW6-W2A, B	26374-7	< 0.001	< 0.001	< 0.001	< 0.001
MW-7	8/13/92	MW7-W2A, B	26374-8	< 0.001	< 0.001	< 0.001	< 0.001

Table 6

#### TOTAL LEAD USEPA METHOD 6010 OR 7421 WATER SAMPLE RESULTS SUMMARY

Monitoring Well	Date	Burlington I.D. No.	Lab I.D. No.	Lead (mg/ $\ell$ )
MW-4	8/13/92	MW4-W3	26374-9	0.10
MW-5	8/13/92	MW5-W3	26374-10	0.29
MW-6	8/13/92	MW6-W3	26374-11	0.13
MW-7	8/13/92	MW7-W3	26374-12	0.012*

<sup>\*</sup>Method 7421

Table 7

#### DISSOLVED LEAD USEPA METHOD 7421 WATER SAMPLE RESULTS SUMMARY

Monitoring Well	Date	Burlington I.D. No.	Lab I.D. No.	Lead (mg/ $\ell$ )
MW-4	8/13/92	MW4-W4	26374-27	< 0.005
MW-5	8/13/92	MW5-W4	26374-28	< 0.005
MW-6	8/13/92	MW6-W4	26374-29	< 0.005
MW-7	8/13/92	MW7-W4	26374-30	< 0.005

#### 3 <u>SUMMARY OF FINDINGS</u>

The sampling and observations made at the time of the UST removal, and the subsequent soil and groundwater sampling completed during the Limited Site Characterization investigation, indicate that a leak of heating oil from Tank T2-E has impacted the soils and groundwater at the site. Soil contaminated by downward vertical migration of heating oil appears to have been removed during the tank excavation process. One soil sample, collected from MW-3, exceeded MTCA cleanup standards for TPH. This TPH contamination is likely the result of heating oil which mounded on the groundwater surface and spread radially outward from the mound. This type of migration is typical behavior for LNAPLs on groundwater, and accounts for the presence of contamination immediately above the groundwater surface at a location upgradient from the release. Examination of cuttings and soil samples from wells (MW-1, MW-2, MW-3) located adjacent to the tank excavation suggest that residual soil contamination is likely limited to a thin soil zone above the groundwater surface in the area immediately adjacent to the tank excavation.

Relatively low levels of TPH were detected in soil samples from wells MW-1, -2, -4, -5, -6 and -7. The levels of contamination were less than one-third of the MTCA cleanup standard in all cases. These low levels of contamination occurred in samples collected immediately above the groundwater surface and may have resulted from contact of the soil with a thin layer or sheen of LNAPL migrating on the groundwater surface. A thin LNAPL layer (0.01 inch or less) was detected in wells MW-1 and MW-2. No LNAPL was detected in MW-4, -5, -6 or -7.

Groundwater samples were not collected from well MW-1, MW-2 and MW-3 due to the presence of LNAPL and the potential for LNAPL to cross-contaminate samples. Groundwater samples from wells MW-4, -5, -6, and -7 had TPH detections below (MW-4, -6, -7) or equal to (MW-5) the MTCA cleanup standard of 1.0 ppm. These results indicate that some released heating oil has dissolved in the groundwater. TPH detected in groundwater from upgradient of the release (well MW-7) may result from temporal variations in groundwater flow direction, but a potential upgradient off-site source of contamination cannot be ruled out at this time.

Groundwater that potentially exceeds the MTCA cleanup levels for TPH appears confined to the immediate vicinity of the tank excavation and the area between MW-4 and MW-6 extending down gradient to well MW-5.

BTEX compounds were not detected above the method detection limit (MDL) of 0.001 ppm in any of the water samples analyzed. Likewise, dissolved lead was not detected at the MDL of 0.005 ppm, which corresponds to the MTCA cleanup standard for lead in groundwater. Total lead values from unfiltered samples exceeded the cleanup standard for all samples analyzed. Comparison of total and dissolved lead analyses suggests that excess turbidity in the unfiltered samples is responsible for the elevated lead levels recorded in these samples.

#### 4 LIMITATIONS OF STUDY

This environmental investigation has been prepared for the exclusive use of WNG in evaluating the environmental liabilities associated with the property described in this report. This report has been prepared in accordance with generally accepted environmental consulting practices; no other warranty, express or implied, is made to the professional advice included in this report. This report has not been prepared for use by parties other than WNG or its authorized users, or for uses other than those stated above and as defined in the contract. Completion of the investigation and implementation of related recommendations cannot entirely eliminate the risk that undiscovered environmental liabilities may later become apparent.

Conclusions and recommendations expressed in this report are based in part on information obtained from discrete locations at the times and under the conditions described herein. This information is point-specific and is not considered to be descriptive of conditions over the entire parcel or site. Variations may be expected between, below, and beyond sampling points and changes in the conditions reported may occur with time. Conclusions and recommendations in this report are based in part on the consultants' judgement and expertise and interpolation and extrapolation of the data points.

APPENDIX A

Borehole Logs

			62612: MW-1	Elevati		. Nacion	ar Gu	laru,	TOP	Date:	sh, Washington 8/11/92,			
	g Numb		MM-1	GWL:	Depth: 10.5	Date/Time:	8/11/9	2, 8:30		Time: 3:00				
		ologist:	K. Tahgni	1	Depth: 10.6	Date/Time:		2, 12:30	1	Air Moni				
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enth	Sampl	e No.	Blows on	Recover	У		USCS	Depth	Air Mon	itor	W	Drilling		
Ft)	an		Sampler	(Feet)	SAMPLE DESCRI	PTION	Symbol	Change	Unit	s: ppm	Conditions			
			Per 6 in.					(Feet)	BZ	ВН	S	and Remarks		
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5					Brown clayey silt, s									
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10	55-1	9.5-11.5	42-49	1.17	sand and fine gravel		GW							
			37-52											
							1 5							
			, 101					12						
			R. C.				1	17.						
		2	1					14.						
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		Continued drilling at 11:25. Approximately 0.01 feet of free product encountered.				tion Dat		8/11/92						
				feet of		tion Tim	e:	12:20						
					Boring	: _								
						7 4					1			
							Well I	nstalled	:	٠.	-	YES		
							Wall .							
							Well Installation:							
							Well Protections							
						Well Protection:								

Boring Number: MW-2 Elevation:				on: 99.3	penish, Washington Date: 8/11/92,						
oordina			GWL:	Depth: 10.5	Date/Time:		2, 15:2		Time:	15:	
ngineer	/Geologist:	K. Tahghi		Depth: 10.5	Date/Time:	8/11/9	2, 16:3	0	Air Moni	tor Typ	e: HNU PID
	Methods:	HSA 4-1/4	I.D.								
riller:		J. Dolan			Helper:	J. Pea	le		Rig:		
			-			1					
	mple No.		Recover					Air Mon			Drilling
Ft)	and	Sampler	(Feet)	SAMPLE DESCR	IPTION	Symbol	Change		s: ppm		Conditions
II	nterval (ft.)	Per 6 in.	1 1 1 1 1 1				(Feet)	And designation of the last of	ВН	S	and Remark
		The sea		Asphalt and stone			0.5				Top of we
	A STATE OF THE STATE OF		1 16 5			1.00		100	160		riser ELEV. 99.2
		10 10	100			14	100				ELEV. 77.2
		F 8					1000	A 7 30		AL THE	
						Pos				47.7	
			1.14					- 10		1 6	
							1				
								e 184			
5		100 m	200	Brown fine to coars			100				The state of
		1 300		sand and gravel, wi	th	GW				11.11	
			15	some silt.							
12.74										250	
			4.0								
			F- 55			1 96					
		To be a								100	
			1 Y 1				- 14		1.85		
10 SS-	-1 9.5-10.8	27-50	1.25					0	0		0
		60/411				100	76.			37.15.54	J. J. 10.
		1000								to Table	
		Marie Control	17.2								p Tou
							12	100			
					Sept. 1					7.	
			- 11						P. Pak		
			NO INC.	Brown-gray fine to	coarse						16 2 3 4 7
15	5-1 T			gravel, some fine t		GW			100		
		Burnel		sand, trace to some	silt.						
30								71.00			
							EL TOU		Nus yes		
							No. 1	0		NA	
				END OF BORING AT 19	1			- 0	0	MA.	
20											
7 THE								Self 1	17		
					Taken I						
DTES:	Approxima	tely 0.01	feet of	free product encount	ered.						
	8/13/92: Only sheen and odor present.				tion Dat		8/11/92				
	8/13/92:	Only sheet	n and od	or present.			tion Tir	ne:	16:15		
						Boring:					
						Well Ir	etalla	4.			YES
						wett II	statte	••			_ 153
					Well Installation:						
						IMerr in	istallai	non:			
						Wett Ir	istalla	ion:			

			Nation	al Gu	lard	, To	oppenish, Washington Date: 8/11/92,						
			MW-3	The same of the same of	The second second	99.9	Desa/Times	9/11/0	2, 9:	7E		Contract of the Contract of th	
_	inates	THE RESERVE OF THE PERSON NAMED IN		GWL:	Depth:	10.5	Date/Time:		2, 11:		Time:	8:5	
Engin	eer/Ge	chods:	K. Tanghi HSA 4-1/4		Depth:	10.7	pate/ime:	0/11/5	, 11:	22	AIF MON	itor Type	: HNU PID
Drill		thous:	J. Dolan	1.0.			Helper:	J. Pea	10		Rig:		
UTILL	er:		J. Dotan			NAME OF TAXABLE PARTY.	Inether:	J. Pec	116		ikig:		
Donth	Sampt	a Na	Blows on	Recover				luscs	Inanth	Air Mo	niton		Drilling
(Ft)	an		Sampler	(Feet)	,	SAMPLE DESCRI	DTION		Change		its: ppm		Conditions
(re)		rval (ft.)				SAMPLE DESCRI	FILON	Symbol	(Feet		BH	IS	land Remarks
	Tille	vat (it.)	rei o iii.	-	Acphal t	and stone			0.5		Dil	1 3	First attempt
					ASDITAL	and scone			0				encountered an abandoned
-						ine to coarse		011					steel pipe at 1", at 2'.
-					some T1	ne to coarse	sand.	GW	3			ed yes	Offset boring
-	42.19										3		
_5					fine to	layey silt, s medium sand,					* * *		
-					fine gr	avel		CL	6				
-					* 1								
-					fine to	ray fine grav coarse sand,							
-					silt.			GW	9			8	First sample did not have
_10	SS-1A	9.5-11.5	25-37 42-46	0.83							6		enough soil.
-	SS-1B	10-11.5	18-71-42	1.17	1000	ine to coarse			- 1		7.4		
-					gravel,	some fine to sand, trace g		GW		NA	NA.	10	S-1B was
-					coarse	said, trace 9	avet.	GW.		, a	100	10	obtained.
15					-5								sample was obtained from
_15		4: 1:											S-1B. Lead sample was
-													obtained from both S1-A
													and S-18.
-	-				FUD OF	BORING AT 18.5	= 1						Top of well
-		12-1	4.00		END OF I	SUKING AT TO.		Œ.					Top of well riser ELEV.
_20													99.79
NOTES:	Augers 5' - 10' HNU: 6 BZ <1 Augers 10' - 15' HNU: 15 BZ = 1 Augers 16' HNU: 35 BZ <2 8/11/92 11:35, 0.01' free product encountered. 8/13/92: Only sheen and odor present.		BZ = 1 Cor BZ <2 Cor		Complet Complet Boring:	ion Ti		8/11/92 11:20					
				Well Ir	stalle	d:			YES				
								Well Ir	stalla	tion:			
							Well Protection:						

	ect No.:				. Nation	ar Gu	lara,				shington	
Boring Number: MW-4 Elevati Coordinates: IGWL:				9.412.402 7-00			Date: 8/12/92 Time: 6:45					
Coordinates:  GWL: Engineer/Geologist: K. Tahghighi		THE RESERVE OF THE PARTY OF THE	Depth: 10 Date/Time:					6:				
				Depth: 9.8	Date/Time:	8/12/9	2, 9:10		Air Moni	tor lyp	e HNU PID	
rille	ng Methods:	HSA 4-1/4	1.0.		Helper:	J. Pea	10		Rig:		DI 40	
ritte	Γ:	J. Dotan			merper.	J. Fea	te		Kig.			
enthi	Sample No.	Blows on	Recover	v		luscs	Depth A	ir Moni	tor		Drilling	
Ft)	and	Sampler	(Feet)	SAMPLE DESCRIPTION					: ppm	Conditions		
1	Interval (ft.)				7	(Feet)	BZ i	BH	S	and Remarks		
-	Title val (ite.)			Stone			0.21				Top of well	
						1	100				riser ELEV.	
			F-12 1 19	Brown silt, some cl	ay,			100			98.73	
			1 3	some fine sand.		ML/CL	2	Table 19				
1000			ar I			2.75						
						1						
To the			19				75					
			19									
				Brown fine sand, so	me							
5				silt, trace clay.		SP	5					
						11.9					1.2	
						1. 11.11						
		1	15 1									
		and the second				A m	9 - 4 5		3 1			
								-				
							4.1					
-				Brown fine to mediu			19 4 5					
1	8.5-10.5	7-8	1.7	some fine to coarse		SM		0	0		0	
10		11-22		gravel, trace silt.				- "			the syn or the	
							- 177					
-			the Total			200	1, %				4 4 4	
	and the second		2.0				40					
							12					
									2 2 2			
			The state of the s			7.5 7/						
-												
15												
-13		The state of the s										
			1	Brown fine to coars	e sand			8.4				
-				and fine to coarse								
				trace silt.		GW	17	501				
5/5/				Brown coarse to fine	e gravel,	GW		0	0 1	A		
20				some fine sand, tra				6 10				
				END OF BORING AT 20								
				THE REPORT OF THE PARTY OF THE						77-16-1		
OTES:	First att	empt encou	ntered s	poon refusal twice.								
				e first boring was			tion Date		8/12/92			
	abandoned	and the h	ole was	plugged by bentonite	chips.		tion Time	::	8:30			
						Boring:		<b>湖北</b> 县, 19年35				
						Well Installed: YESYES						
						Well Installation:						
						Hall Bassasian						
						Well Protection:						

# $\begin{array}{c} {\tt BURLINGTON~ENVIRONMENTAL~INC.}\\ {\tt Geologic~Log~/~Record~of~Subsurface~Exploration} \end{array}$

Pro	ject No.:	62612	1		Project:	Nation	al Gu	lard,	Top	penis	h, W	ashington
Boring Number:		MW-6  Elevati		ion: approx. 99.9		The second			Date: 8/12/92			
	inates:		GWL:	Depth:	10.5	Date/Time:	8/12/9	2, 15:40	0	Time:		:20
	eer/Geologist:	K. Tahghi		Depth:		Date/Time:		SEVENDEN		Air Mon	itor T	yce HNU PID
Drill	ing Methods:	HSA 4-1/4	I.D.			[11-1				In:	A - 373	
Drill	er:	J. Dolan				Helper:	J. Pea	le		Rig:		
Denth	Sample No.	Blows on	Recover	·v			iuscs	Depth	Air Mon	itor		Drilling
(Ft)	and	Sampler	(Feet)	1	th:   10.5   Date/Time: 8/12/9 th:   Date/Time:	Change		s: ppm		Conditions		
1.341	Interval (ft.)			1 - 1				(Feet)	BZ	ВН	S	and Remarks
		100		Asphal	t and stone			0.5				Top of well
-			Par I	The last								riser ELEV
N. C.			The state of									99.55
-		1. 1. 1.					-					
No. 1												
			100	The state of								
_		Leaf leg T		-								
	44. A.		7 80	10 %			136					
_5			- 25			е	100					t-year-
2.3							MI	6		Part I		
-				- Ci dec .	01471	W.	11.0				G 9.	
		Ter a	7 15						144			
			15-15-16	gr - gr				1.				
-		1900	-	118						57.45h <sup>24</sup>	100	
			-				100				100	
-		1	100	Brown	fine to coarse	gravel.						Hard drilling
_10	SS-1 8.5-10.5	25-40	1.7				GW		0	0		0 from 6'.
		60-62	W 7 114 4	trace s	silt.			100				- W. W.
_	A 2 10											
		100		100			Serve !					
-									19 2 5 1			146
			4.81				12 3		- 1			
_	Register of	1									greet .	
_			0.7									
45			1 17								NA	
_15				41,5					٩	٩	NA	
			1.2									
_												
			34					1 8 1		1		
-			100									
	10 A											
				a Palmar			Sec. 9		445			
20				END OF	PORTUG AT 201							
				END OF	BORING AT 20		1					
NOTES							W-3					
								ion Date		8/12/92		
								ion Time	e:	16:00		
							Boring:	-	-			
							Well In	stalled	:			YES
										-	pro-	
							Well In	stallati	ion:	-		
							Well De	otection				
								2200101				

Project No.:	62612 MW-5	1  Elevati	Project	: Nation	al Gu	uard,	Top	penish	, Was	hington	
Boring Number: MW-5 Elevat Coordinates: GWL:					9/17/0	2 12-00	,	Date: 8/12/92			
ingineer/Geologist:	K. Tahghi		Depth: 10 Date/Time: Depth: 10.7 Date/Time:					Time: 11:30 Air Monitor Type: HNU PID			
rilling Methods:	HSA 4-1/4		peptil. 10.7	pate/ ine.	3/12/5	72, 12:30	,	IAIT MONII	or Type	HNU PID	
riller:	J. Dolan			Helper:	J. Pea	ale	5.00	Rig:			
				THE CASE OF STREET				IKIA			
epth Sample No.		Recover	[18 <b>:</b> 18 ] 18 [18] 18 [18] 1 [18]		USCS Depth Air Mo				Drilling		
Ft) and	Sampler	(Feet)	SAMPLE DESCR	Symbol			s: ppm	Conditions			
Interval (ft.	) Per 6 in.		A			(Feet)	3Z BH S		S	and Remarks	
			Asphalt & stone			0.5				Top of well riser ELEV. 98.63	
5			Brown clayey silt, some fine sand.	CL	5						
			Brown fine sandy si some clay.	lt,	SM	8					
ss-1 8.0-10.0	16-34 35-30	1.4					0	0	0		
			Brown fine to coarse sand and fine grave trace silt.		SW/ GW	12					
15			Brown fine to coarse gravel, some fine to sand, trace silt.		G₩						
20			END OF BORING AT 19'								
OTES:					Complet Boring: Well In	tion Date tion Time	1	8/12/92 12:35		YES	
						otection				1815 7	

Project No.: 62612 Boring Number: MW-7		Elevat	Elevation: appro						penish, Washington  Date: 8/12/92			
Coordinates:	:	GWL:	Depth:	10	Date/Time: Date/Time:	8/12/9	2, 17:2	0	Time:	17:0		
Engineer/Geolog Drilling Method		4-1/4 I.D.	Depth:		Date/: ine:				Air Moni	tor Typ	e HNU PID	
Driller:		olan	I Phase Section		Helper:	J. Pea	ile		Rig:			
										Transfer Pro-		
(Ft) Sample No.	Samo	response to the second	SAMPLE DESCRIPTION			USCS Symbol	Change		s: ppm	Drilling Conditions		
Interval	(ft.) Per	6 in.	10-1-10				(Feet)	3Z	ВН	S	and Remarks	
5			Brown clayey silt, some fine sand			ML/ CL					Top of well riser ELEV. 99.30	
			Brown silty to coarse gravel fine sand.	fine to Land		GW/	9			30		
10 ss-1 9.0-	11.0 17-3 42-8				180			0	0	(		
			Brown fine to and fine to d trace silt.			G₩						
15												
20				FIG 11		13000		0	0	NA ·		
			END OF BORING	AT 201								
OTES: 8/13/	/92: Slight	odor preser	t.				ion Dat		8/12/92 19:00			
							nstalled nstallat				YES	
						Well Pr	otectio	n:				

APPENDIX B

Field Exploration Methods

#### APPENDIX B

#### FIELD EXPLORATION METHODS - DRILLING

The seven soil boreholes were drilled by Burlington Environmental Inc. (Burlington Environmental) using hollow-stem auger drilling techniques to penetrate the unconsolidated sediments. All drilling, sampling, and well construction was conducted under the direction of a Burlington Environmental field geologist. The soil samples were logged and classified according to the Unified Soil Classification System. The borehole logs are presented in Appendix A.

Total depths of the boreholes range from 17 to 20 feet below ground surface (see borehole logs for actual depths). Soil samples were collected by driving a 2-inch or 3-inch (outside diameter) split-spoon sampler 18 to 24 inches into undisturbed soil in advance of the auger bit using a 140-pound hammer free-falling a distance of 30 inches.

Part of the sample was sealed in a laboratory-supplied glass sample jar, with a Teflon-lined lid, for laboratory analysis; part of the sample was reserved for field screening. The field screening consisted of sampling for organic vapors using a photoionization detector (PID). The PID readings are listed on the borehole logs in Appendix A. The PID readings were used as a field screening tool only, and did not provide quantitative data but enabled samples to be compared relative to each other.

The samples were labeled, and immediately placed on ice for storage and transport to the laboratory following strict Burlington Environmental chain-of-custody procedures. The augers, other drill tools, and sampling equipment were steam-cleaned between boreholes. All formation cuttings were left on site in sealed drums.

Monitoring wells were installed in all boreholes using flush-threaded two-inch diameter schedule 40, PVC casing and well screen. The bottom of each casing string consisted of a 10-foot section of factory-slotted (0.010-inch slots) well screen. Blank casing was installed from the top of the well screen to ground surface. Washed silica sand (10-20 mesh) was installed in the annulus around the well screen to two feet above the top of the screen. A bentonite seal approximately 1.5 feet-thick was installed above the sand pack. The remaining annulus was filled with granular bentonite. All wells were completed with traffic box covers set in concrete

flush with the ground surface. The northwest corner of the concrete pad, approximately 45 feet north of MW-6, was assigned an elevation value of 100.00 feet. The top of the well casing and adjacent ground surface at each well were surveyed for elevation relative to the assumed datum and for relative location with respect to each other and to site features. Well completion information is presented in Appendix C.

Wells MW-1, MW-2, and MW-3 were not developed due to the presence of LNAPL on the water. Wells MW-4, -5, -6, and -7 were developed using a hand rod pump. The volume removed from the wells equalled a minimum of three times the well volume as calculated using standard Burlington Environmental protocol in which one well volume equals the volume of water in the casing plus the water in the gravel pack, assuming 40 percent effective porosity. For each well, conductivity and temperature showed stability at development completion. The development water was put in drums which were then sealed and staged on site. Following development, a groundwater sample was collected from each well, chilled on ice, and transported to the laboratory following strict chain-of-custody procedures.

Soil and groundwater samples were submitted to Sound Analytical Services, Inc., of Tacoma, Washington, for chemical analysis. The laboratory reports, the analytical data review, and the chain-of-custody records are included in Appendices D, E, and F, respectively.

#### APPENDIX C

Well Completion Reports

Stylen ray distribution

でした。これの数据は、影響は新聞表示です。

							Well Con	mpletion Report
Site #: 626121			Con	inty )	Volim	2		
								Easting
Drilling Contractor: Bur								
Driller: J. Dollan	,	(	Geologist:	K. TAI	46HI 6HZ		Date	Completed: 8/11/92
Drilling Method: HSA	1 41	14"	I.D.		Dri	lling Flu	ids (type):	
Annular Space Detail	ls						Elevatio	ns01 ft.
Type of Surface Seal:	CEMEN	IT			Ī		_ = =	MSL Top of Protective Casir MSL Top of Riser Pipe ft. Casing Stickup
Type of Annular Sealant:	GRANUC	AR BE	NTONITE		T	YTT		
Amount of cement: # of					50	19:4		MSL Ground Surface ft. Top of annular sealant
Amount of bentonite: #						1 1		- the top of annual sealant
					7.	0 9.1		
Type of Bentonite Seal (Gran	nular, Peilet	): <u>Gya</u>	nular		4	0		
Amount of bentonite: * of Ba	1gs		lbs. per bag	50	T. VII. A. Z. M. GELL	Viel Parent de N		
Type of Sand Pack: 10-	20	Silica	Sand					
Source of Sand:								
Amount of Sand: # of ba	gs	14	lbs. per bag	100			and the second	
Well Construction Ms	terials				.			
	2	2	9	90				
	. 4	7	5	5		1 .		
				-	1 1	1 1		
	la l	lor	C	her		-		
	Stainless Stoel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type				
Riser coupling joint .	Stain! Steel Bpecif	Teflor	PVC Specify	Other				
Riser coupling joint .  Riser pipe above w.t.	Stainl Steel Specif	Teflor	PVC Specify	Other				
	Steinl Steel Specif	Teflor	scH 40	Other				
Riser pipe above w.L.	Stainl Stoel Bpecif	Teflor		Other Specify				
Riser pipe above w.t. Riser pipe below w.t.	-	Teflor	scH 40	Other Specify				
Riser pipe above w.t. Riser pipe below w.t. Screen	-	Teflor	scH 40	Other				
Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise	-	Teflor	scH 40	Other				
Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing			scH 40					-1-5 ft. Top of Seal
Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing			SCH 40					4 ft. Total Seal Interval
Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing Measurements		8.5'	SCH 40					4 ft. Total Seal Interval
Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing Measurements Riser pipe length		8.5' 1.5' (	SCH 40  SCH 40  here applicat	ble)		(A-1)	The wife	4 ft. Total Seal Interval
Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing Measurements Riser pipe length Protective casing length	to	8.5' 1.5'(	SCH 40  SCH 40  here applicat	ble)			The wife	4 ft. Total Seal Interval
Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing Measurements Riser pipe length Protective casing length Screen length	to	8.5' 1.5' (	SCH 40  SCH 40  here applicat	ble)				4 ft. Total Seal Interval
Riser pipe above w.t.  Riser pipe below w.t.  Screen  Coupling joint screen to rise  Protective casing  Measurements  Riser pipe length  Protective casing length  Screen length  Bottom of screen to end cap	to	8.5' 1.5' (	SCH 40  SCH 40  here applicat	ble)				4 ft. Total Seal Interval 6.5 ft. Top of Sand  8.5 ft. Top of Screen
Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing Measurements Riser pipe length Protective casing length Screen length Bottom of screen to end cap Top of screen to first joint	to	8.5' 1.5' (	SCH 40  SCH 40  here applicat	ble)	- C. C.			4 ft. Total Seal Interval 6.5 ft. Top of Sand  8.5 ft. Top of Screen
Riser pipe above w.t.  Riser pipe below w.t.  Screen  Coupling joint screen to rise  Protective casing  Measurements  Riser pipe length  Protective casing length  Screen length  Bottom of screen to end cap  Top of screen to first joint  Total length of casing	to	8.5' 1.5' ( 10' 18.5	SCH 40  SCH 40  here applicat	ble)	349			4 ft. Total Seal Interval 6.5 ft. Top of Sand  8.5 ft. Top of Screen
Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing Measurements Riser pipe length Protective casing length Screen length Bottom of screen to end cap Top of screen to first joint Total length of casing Screen slot size	to	8.5' 1.5' ( 10' 18.5	SCH 40  SCH 40  here applicat	ble)				4 ft. Total Seal Interval 6.5 ft. Top of Sand  8.5 ft. Top of Screen
Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing  Measurements  Riser pipe length Protective casing length Screen length Bottom of screen to end cap Top of screen to first joint Total length of casing Screen slot size "to of openings in screen	to	8.5' 1.5' ( 10' 18.5	SCH 40  SCH 40  here applicat	ble)				4 ft. Total Seal Interval 6.5 ft. Top of Sand  8.5 ft. Top of Screen

								Well	Comp	letio	n Rep	ort
- 12/101			•	У.	Kima	,		· ·	r_11 m	M	W-2	2
Site #: 626121												
Site Name: National	Guard	d. 70-	in-ni-n	Grid C	cordinate:	Nort	hing -			Eas	sting	
Drilling Contractor: Rurl	ington	Eny	ronmen.	Tal	Inc.	[	ate D	rilled Sta	ırt:	3/	1/4	2/11/2
Driller: J. Doll A.	1)	(	Geologist:	K. TA	11-15-11	6.4	1		Date Co	mplete	d:	711/92
Drilling Method: 454	1 41	14"	I.D.		D	rilling	Fluid	is (type):				
Annular Space Detail	s							Eleva	ations			
Type of Surface Seal:	c Em ENT						=	# 178 man	1	MS	L Top	of Protective C.
Type of Annular Sealant:	62mi	AL BO	STINGTW			TY	TT					Stickup
Amount of cement: # of	bags	lbs.	per bag		60		6.4	_	-			nd Surface annular sealar
Amount of bentonite: #							1			- 10	. Top or	amunin Scarai
					7		0 11					
Type of Bentonite Seal (Gran	ular, Peilet	): <u>Gra</u>	unu lar		10		Sig					
Amount of bentonite: # of Ba	gs <u>2</u>		lbs. per bag	50	2		No.					
Type of Sand Pack: 10-												
Source of Sand:COLO						1	11					
Amount of Sand: # of ba	/	3/4	lhs per hag	100								
Amount of Janes a de de	2.37				185e - In							
						1	1 1					
Well Construction Ma	terials											
Well Construction Ma	terials				.	A.						
Well Construction Ma			2	90	i l	heor.						
Well Construction Ma	2	Type	Туре	Туре								
Well Construction Ma	2	on cify Type	cify Type	er cify Type								
Well Construction Ma	Stainless Steel	Teflon Specify Type	PVC Specify Type	Other Specify Type								
Well Construction Ma	2	Teflon Specify Type	PVC Specify Type	Other Specify Type								
	2	Teflon Specify Type	PVC Bpecify Type	Other Specify Type								
Riser coupling joint	2	Teflon Specify Type	SC4 40	Other Specify Type								
Riser coupling joint Riser pipe above w.t.	2	Teflon Specify Type	The William	Other Specify Type								
Riser coupling joint Riser pipe above w.t. Riser pipe below w.t.	Stainless Steel Specify Type	Teflon Specify Type	SC4 40	Other Specify Type				T.A.S.				
Riser coupling joint Riser pipe above w.t. Riser pipe below w.t. Screen	Stainless Steel Specify Type	Teflon Specify Type	SC4 40	Other Specify Type								
Riser coupling joint Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise	Stainless Steel Specify Type	Teflon Specify Type	SC4 40	Other Specify Type						5		
Riser coupling joint Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing	Stainless Steol Steol Specify Type		SC4 40							5 a	Top of S	Seal
Riser coupling joint Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing Measurements	Stainless Steol Steol Specify Type	.01 ft_(w	SCH 40					Trues.	<u>-1</u>			Seal eal Interval
Riser coupling joint Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing	Stainless Steol Steol Specify Type	, .01 ft. (w	SCH 40 SCH 40 here applicat	blei					4	.5 n		eal Interval
Riser coupling joint Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing Measurements	Stainless Steel Specify Type	9.01 ft. (w	SCH 40	blei			(-i-1) (		4	5 m	Total Se	eal Interval
Riser coupling joint Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing  Measurements Riser pipe length Protective casing length	Stainless Steel Specify Type	9 .01 ft. (w	SCH 40 SCH 40 bere applications (Rush mo	blei			(4.6.4.p) XXXX		<u>4</u>	5 r	Total Se	eal Interval
Riser coupling joint Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing  Measurements Riser pipe length Protective casing length Screen length Bottom of screen to end cap	Stainless Steel Specify Type	0.01 ft. (w 8' 1.5' 10' 18'	SCH 40 SCH 40 bere applications (Rush mo	ble)			*25.65.05 ***********************************		_4	5 r	Total Se Top of	sal Interval Sand Screen
Riser coupling joint Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing  Measurements Riser pipe length Protective casing length Screen length Bottom of screen to end cap Top of screen to first joint	Stainless Steel Specify Type	9 .01 ft. (w	SCH 40 SCH 40 bere applications (Rush mo	ble)		**************************************	(1, %) (4, %) (8, %) (		_4	.5 r.	Total So Top of Top of	sai Interval Sand Screen
Riser coupling joint Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing  Measurements  Riser pipe length Protective casing length Screen length Bottom of screen to end cap Top of screen to first joint Total length of casing	Stainless Steel Specify Type	0.01 ft. (w 8' 1.5' 10' 18'	SCH 40 SCH 40 bere applications (FLUSH MO	blei out)			\(\times\)\(\ti		_4  	5 m	Total So Top of S	sal Interval Sand Screen
Riser coupling joint Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing  Measurements  Riser pipe length Protective casing length Screen length Bottom of screen to end cap Top of screen to first joint Total length of casing Screen slot size	Stainless Steel Specify Type	0.01 ft. (w 8' 1.5' 10' 18'	SCH 40 SCH 40 bere applications (FLUSH MO	ble)					_4  	5 m	Total So Top of S	sai Interval Sand Screen
Riser coupling joint Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing  Measurements  Riser pipe length Protective casing length Screen length Bottom of screen to end cap Top of screen to first joint Total length of casing Screen slot size % of openings in screen	Stainless Steel Specify Type	0.01 ft (w 8' 1.5' 10' 18'	SCH 40 SCH 40 bere applications (FLUSH MO	blei out)			\$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		_4  	5 m 6 m	Total Se	sal Interval Sand Screen
Riser coupling joint Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing  Measurements  Riser pipe length Protective casing length Screen length Bottom of screen to end cap Top of screen to first joint Total length of casing Screen slot size "t of openings in screen Diameter of borehole (in)	Stainless Steel Specify Type	0.01 ft. (w 8' 1.5' 10' 18'	SCH 40 SCH 40 bere applications (FLUSH MO	blei out)			\$1,000 per 200		_4  	5 m 8 m	Total Se Top of Se Total Se Bottom	Sand Screen Creen Interval
Riser coupling joint Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing  Measurements  Riser pipe length Protective casing length Screen length Bottom of screen to end cap Top of screen to first joint Total length of casing Screen slot size "t of openings in screen	Stainless Steel Specify Type	0.01 ft (w 8' 1.5' 10' 18'	SCH 40 SCH 40 bere applications (FLUSH MO	blei out)			\$ \$ 1.00 \tau \tau \tau \tau \tau \tau \tau \tau		_4  	5 m 8 m	Total Se Top of Se Total Se Bottom	sal Interval Sand Screen
Riser coupling joint Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing  Measurements  Riser pipe length Protective casing length Screen length Bottom of screen to end cap Top of screen to first joint Total length of casing Screen slot size "t of openings in screen Diameter of borehole (in)	Stainless Steel Specify Type	0.01 ft. (w 8' 1.5' 10' 18'	SCH 40  SCH 40  bere application  (Rush mo	ble)		A.E.	\$4.00 \\ \tau		_4  	5 m 8 m	Total Se Top of Se Total Se Bottom	Sand Screen Creen Interval

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							Well Completion	Report
Site #: 626/21			Соц	aty	Kima		Weil * MW- 3	3
Site Name: National								
Drilling Contractor: Bur	linaton	Enviro	rmental	. Inc.		Date Dri	Hed Start: 8/11/4:	2
Driller: J. Dollan	0		14	TAI	ICUTCUT		2 2	2/11/2:
Driller: U. Vollum		" -	leologist:	. / / / /	100.00		Date Completed:	3/11/72
Drilling Method: HSA	B 4 1/4	I.D	).		Drillin	g Fluids	(type):	
Annular Space Detail  Type of Surface Seal:  Type of Annular Sealant:  Amount of cement: # of Amount of bentonite: #  Type of Bentonite Seal (Grant Amount of bentonite: # of Ba  Type of Sand Pack:  Source of Sand: 10-20  Amount of Sand: # of ba  Well Construction Ma	bags of bags nular. Peilet gs Silic gs 1	lbs. lbs.  lbs.  Sa	per bag per bag per bag nu   w	50		D. N. W. S. F. T. G. W. S. F.	MSL	Top of Protective Ca. Top of Riser Pipe
well Construction ma	COLIMIN	8	<u> </u>					
	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type				
Riser coupling joint .			10.16.4					
Riser pipe above w.L			SCH 40					
Riser pipe below w.t.								
Screen .			SCH 40					
Coupling joint screen to rise	F ALLAS	14.00		1 day			ALTO MARKET	Alternative services
Protective casing		19.75		2196				
Measurements	t	w) £10. c	here applicat	ole)				p of Seal tal Seal Interval
Riser pipe length	سندا	8'	7				6 R T	
n	2.02	_	WSH MOUN	(T)	3	12.		Fig.
Protective casing length		STATE OF THE PARTY	State of the second	104 11 12	15	14:	-8 n To	p of Screen
Screen length		18'		W. 7 1 4 1 7 7 7		3.3	A STATE OF THE STA	
Screen length Bottom of screen to end cap				A 2 4 4 4 5		-:-	A	the said of the said to the said to
Screen length  Bottom of screen to end cap  Top of screen to first joint	1914年1月1日	-13-17-1 <b>3</b> -1	THE RESERVE OF THE PERSON NAMED IN COLUMN TWO	Charles and the second second				
Screen length  Bottom of screen to end cap  Top of screen to first joint  Total length of casing	1914年1月1日	44.5	roma jura ma	207 + FREE \$1.	1			otal Screen Interval
Screen length  Bottom of screen to end cap  Top of screen to first joint  Total length of casing  Screen slot size	1914年1月1日	0.010"	-one constant	207 + FREE \$1.	<b>1</b>			otal Screen Interval
Screen length  Bottom of screen to end cap  Top of screen to first joint  Total length of casing  Screen slot size  " of openings in screen	1914年1月1日	0.010"	rent i jos ne Den i lest ge	207 + FREE \$1.				
Screen length  Bottom of screen to end cap  Top of screen to first joint  Total length of casing  Screen slot size	1914年1月1日	0.010"	-one constant	207 + FREE \$1.	13. 5			

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							Well	Comple	tion R	eport
Site #: 626/21		17.2	Cou	nty)	12 Kim.	,	w	ell #	M'M-	5
Site Name: National	Guard	Torro	" -' W	4 Grid C	oordinate: N	orthing _			Easting	The Part of the second
Drilling Contractor: Burli	tou	Favirage	mental	Inc.		Date D	rilled Sta	rt: _ 8	/12/9	2
Driller: J. Dolan	C	CHANNE		U T	AUCUL	· II ·	i med out		11	8/12/92
Driller: J. Dolan		G	eologist:	K - 1/	446414	7.72		Date Com	pietea: _	0 / 12 / 12
Drilling Method: 454	41/4	T. D	>-		Dril	ling Fluid	s (type):			
Annular Space Detail	9						Eleva	tions -		
Type of Surface Seal:		-			T	司				op of Protective Casi op of Riser Pipe
Type of Surface Seal:	( 4 4 / 1 1 4 2 )	A STATE	MITE	1	7	\			ft Casi	ng Stickup
Type of Annular Sealant:	SILMUCAR	_ 101/010							MSL G	round Surface
Amount of cement: # of	bags	lbs.	per bag		60	1				of annular sesiant
Amount of bentonite: #	of bags	lbs.	per bag	S. Carlo						
Type of Bentonite Seal (Gran					7.1.4	F.772				
Type of Bentonite Seal (Gran	mar, renet	"			87.9	Pais				
Amount of bentonite: # of Ba	gs	2	lbs. per bag	50	रत्या	Vientaipulasi				
Type of Sand Pack: 10	-20 5	Silica	52× d							
Source of Sand:										
Source of Sand.	2			100						
Amount of Sand: # of ba	gs		lbs. per bag	10)	and Ro	44				
Well Construction Ma	toriale									
Well Construction was	POT TWITTE					1 1 1				
	-				1					
	2		2	od.						
	Туре	Туре	Type	/ Туре						
	inless bl cify Type	lon cify Type	C Type	selfy Type	91.4					
	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type						
Riser coupling joint	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type						
Riser coupling joint . Riser pipe above w.t.	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type							
Riser pipe above w.L.	Stainless Steel Specify Type	Teflon Specify Type	SCH 40							
	Stainless Steel Specify Type	Teflon Specify Type								
Riser pipe above w.t. Riser pipe below w.t.		Teflon Specify Type	SCH 40							
Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise		Teflon Specify Type	SCH 40 SCH 40					_1		
Riser pipe above w.t. Riser pipe below w.t. Screen		Teflon Specify Type	SH40					-1 -7		of Saul
Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise			SH40					-1 - <u>*</u>		of Seal
Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing		o .01 ft. (w	SH40					-1 -2 43		of Seal
Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing		o .01 ft. (w	SCH 40 SCH 40 SCH 40 bere applica	ble				-1 - <u>2</u> 4 <u>3</u> -5	ft_ Tota	- 4
Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing Measurements		0.01 ft (w	SCH 40	ble)				-1 -2 43 -5	ft_ Tota	I Seal Interval
Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing Measurements Riser pipe length	to	7' /' (	SCH 40 SCH 40 SCH 40 SCH 40 FEUSH Mov.	ble)		XX45XX			ft. Tota	I Seal Interval
Riser pipe above w.t.  Riser pipe below w.t.  Screen  Coupling joint screen to rise  Protective casing  Measurements  Riser pipe length  Protective casing length  Screen length  Bottom of screen to end cap	to	7' /'( /o' /7'	SCH 40 SCH 40 SCH 40 SCH 40 FEUSH MOU	ble)				<u>-7</u>	ft. Tota	I Seal Interval of Sand
Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing  Measurements Riser pipe length Protective casing length Screen length	to	0.01 ft. (w 7' /'( /o' /7'	SCH 40 SCH 40 SCH 40 SCH 40 SCH 40 SCH 40	ble <sup>1</sup>				<u>-7</u>	ft. Tota ft. Top	i Seal Interval of Sand
Riser pipe above w.t.  Riser pipe below w.t.  Screen  Coupling joint screen to rise  Protective casing  Measurements  Riser pipe length  Protective casing length  Screen length  Bottom of screen to end cap	to	0.01 ft. (w 7' /' ( /o' /7'	SCH 40 SCH 40 SCH 40 SCH 40 FEUSH May	ble)				-7 h	ft. Tota ft. Top ft. Top	I Seal Interval of Sand of Screen
Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing  Measurements  Riser pipe length Protective casing length Screen length Bottom of screen to end cap Top of screen to first joint	to	0.01 ft. (w 7' /' ( /o' /7'	SCH 40 SCH 40 SCH 40 SCH 40 SCH 40 SCH 40	ble)				-7 h	ft. Tota ft. Top ft. Top	i Seal Interval of Sand
Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing  Measurements  Riser pipe length Protective casing length Screen length Bottom of screen to end cap Top of screen to first joint Total length of casing Screen slot size To of openings in screen	to	0.01 ft. (w 7' /' ( 17' 0.010"	SCH 40 SCH 40 SCH 40 SCH 40 FEUSH May	ble)	1			-7 h	ft. Tota ft. Top ft. Top	of Screen  al Screen Interval
Riser pipe above w.t. Riser pipe below w.t. Screen Coupling joint screen to rise Protective casing  Measurements  Riser pipe length Protective casing length Screen length Bottom of screen to end cap Top of screen to first joint Total length of casing Screen slot size	to	0.01 ft. (w 7' /' ( /o' /7'	SCH 40 SCH 40 SCH 40 SCH 40 FEUSH May	ble)	3			-7 h	ft. Tota ft. Top ft. Top	I Seal Interval of Sand of Screen

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Site Name: \( \frac{\text{AT_2016}}{\text{Colored}} \) County \( \frac{\text{Colored}}{\text{Colored}} \) Well \( \frac{\text{AA_2016}}{\text{Colored}} \) County \( \frac{\text{Colored}}{\text{Colored}} \) Drilling Contractor: \( \frac{\text{Colored}}{\text{Colored}} \) Colored \( \frac{\text{Colored}}{\text{Colored}} \) Drilling Contractor: \( \frac{\text{Colored}}{\text{Colored}} \) Colored \( \frac{\text{Colored}}{\text{Colored}} \) Drilling Method: \( \frac{\text{LSA}}{\text{LSA}} \) \( \frac{\text{Colored}}{\text{LSA}} \) Drilling Method: \( \frac{\text{LSA}}{\text{LSA}} \) \( \frac{\text{Colored}}{\text{LSA}} \) Drilling Fluids (type): \( \frac{\text{Dot}}{\text{MSL}} \) Cool of Riser Pipe Annular Sealant: \( \frac{\text{Colored}}{\text{LSA}} \) \( \frac{\text{LSA}}{\text{LSA}} \) \( \frac{\text{LSA}}{\text{MSL}} \) Cool of Riser Pipe of Annular Sealant: \( \frac{\text{Colored}}{\text{LSA}} \) \( \frac{\text{LSA}}{\text{LSA}} \) \( \text{LS								Well Comp	letion Report
Site Name: VAT MA (MAIN) TOPEN A Grid Coordinate: Northing Easting  Prilling Contractor: BUBLINGTON ENVIRONMENT! INC.  Date Drilled Start: \$\frac{1}{2}\frac{1}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}\frac{1}{2}	Site #: 526121			Сош	nty	Ekima		Weil #	Mi/- 4
Drilling Contractor.    Drilling Contractor.   Drilling Method:   MSL Top of Pentetting MSL Top of River Pipe for Annular Sealant:   Drilling MSL Top of River Pipe for Annular Sealant:   Drilling MSL Top of River Pipe for Annular Sealant:   Drilling MSL Top of River Pipe for River Pipe for Annular Sealant:   Drilling MSL Top of River Pipe for River Pipe for Annular Sealant:   Drilling MSL Top of River Pipe for River Pipe for Annular Sealant:   Drilling MSL Top of River Pipe for River Pipe for Annular Sealant:   Drilling MSL Top of River Pipe for River Pipe for River Pipe for Annular Sealant:   Drilling MSL Top of River Pipe for Rive	Sire Name: NATIONAL C	MARIO	TO PP=	لدا المنجالا	A Grid Co	ordinate: Nor	thing		Easting
Drilling Method: USA 4 Va ID Drilling Sluids (type):  Annual Space Details  Type of Surface Seal: Cament  Amount of cement: of bags Iba per bag Amount of cement: of bags Iba per bag Iba per ba	RURI	NATON	ENV	IKON ME	NT1 1	NC.	Date Dril	led Start:	3/12/92
Drilling Method: LISA 41/2 ID  Drilling Method: LISA 41/2 ID  Annular Space Details  Type of Surface Seal: CEMENT  Type of Surface Seal: CEMENT  Type of Annular Sealant: GRANULL CENTRITE  Amount of cement: * of bag2   1bs. per bag    Amount of bentonite: * of bag3   1bs. per bag    Type of Bentonite Seal (Granular, Pellet): Sealant Surface  Type of Sand Pack: 10-20   51/1CA SAND  Source of Sand: COLORADO  Amount of Sand: * of bag3   2 /2   1bs. per bag   100  Amount of Sand: * of bag3   2 /2   1bs. per bag   100  Well Construction Materials  Riser pipe above w.:  Screen  Coupling joint screen to riser  Protective casing  Measurements  to 01 ft. (where applicable)  Measurements  to 01 ft. (where applicable)  To for Screen to ond cap   16/2	Drilling Contractor:			1/	T11	1001011		D C	8/12/20
Annular Space Details  Type of Surface Seal:  Comest T  Type of Surface Seal:  Comest T  Type of Surface Seal:  Comest T  Type of Annular Sealant:  Amount of Cement: * of bags   1ba. per bag    Amount of Cement: * of bags   1ba. per bag    Amount of Dentonite: * of bags   2   1ba. per bag    Type of Bentonite Seal (Granular, Pellet):  Color ADD  Amount of Sand: * of bags   2   1c. A SAND  Source of Sand: *   10-20   511 CA SAND  Source of Sand: * of bags   2   1ba. per bag   100  Well Construction Materials  Riser coupling joint  Riser pipe below w.t.  Screen   SCAL 40    Coupling joint screen to riser  Protective casing  Measurements  to .01 ft. (where applicable)  Riser pipe length  Screen   SCAL 40    Riser pipe length  Screen no and cap  Top of Screen to and cap  Top of Screen to and cap  Top of Screen to first joint  Total length of casing  Screen slot size   2   10    Color Add Top  Amount of Screen interval  To of riser pipe (in)   2   10    Amount of Screen interval  To of riser pipe (in)   2   10    Amount of Screen interval  Total Screen interval  To of casing in screen  Diameter of borobole (in)   9   10    To of riser pipe (in)   2   10    The Rottom of Screen interval  Total Response in a screen interval  Total Response in a screen interval  Total Screen	Driller: DOLLAN	, 1,	G	eologist:		-,- 3		Date Col	mpleted:
Type of Surface Seal:  CEMENT  Type of Surface Seal:  CEMENT  Type of Annular Sealant:  CANULAR CHITAITS  Amount of Cement: ** of bags   lbs. per bag    Amount of bentonite: ** of bags   lbs. per bag    Amount of bentonite: ** of bags   lbs. per bag    Type of Sentonite Seal (Granular, Pellet):  CANULAR CHITAITS  Amount of bentonite: ** of bags   lbs. per bag    Type of Bentonite: ** of bags   3   lbs. per bag    Type of Sand Pack:   10-20   SILICA SAND  Source of Sand:   COLORADO  Amount of Sand: ** of bags   2 /2   lba. per bag   100  Well Construction Materials  Riser pipe above w.t.  Riser pipe above w.t.  Riser pipe below w.t.  Screen   SCH40    Coupling joint screen to riser  Protective casing  Measurements   to .01 ft. (where applicable)  Measurements   to .02 ft. (which Mounts)  Screen length   f' (Mush Mounts)  Screen length   10 / (Mush	Drilling Method: HSA	41/4	ID			Drillin	g Fluids	(type):	
Riser pipe above w.t.  Riser pipe below w.t.  Screen  Coupling joint screen to riser  Protective casing  Measurements  to .01 ft. (where applicable)  At the coupling joint screen to riser  Protective casing  Measurements  to .01 ft. (where applicable)  At the coupling joint screen to riser  Protective casing  At the coupling joint screen to riser  Protective casing  At the coupling joint screen to fise joint  At the coupling joint screen to first joint  At the coupling joint screen in the coupling joint screen to first joint  At the coupling joint screen in the coupling joint	Type of Surface Seal:  Type of Annular Sealant:  Amount of cement: # of Amount of bentonite: # of  Type of Bentonite Seal (Gran  Amount of bentonite: # of Ban  Type of Sand Pack: 10-2  Source of Sand: Cold  Amount of Sand: # of ban	GRANUL bags of bags ular, Peilet ORADO gs 2	lbs.   lbs.   lbs.	per bag per bag per bag per bag per bag SAND	50				<ul> <li>MSL Top of Protective Ca</li> <li>MSL Top of Riser Pipe</li> <li>ft. Casing Stickup</li> <li>MSL Ground Surface</li> </ul>
Riser pipe above w.t.  Riser pipe below w.t.  Screen  Coupling joint screen to riser  Protective casing  Measurements  to .01 ft. (where applicable)  Left Top of Seal  ft. Top of Seal		Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type				
Riser pipe below w.t.  Screen  Coupling joint screen to riser  Protective casing  Measurements  to .01 ft. (where applicable)  ft. Top of Seal  ft. Top of Seal  ft. Top of Seal  ft. Total Seal Interval  ft. Top of Sand  Protective casing length  ft. Top of Sand  Protective casing length  ft. Top of Screen  Screen length  Screen length  Top of screen to end cap  Top of screen to first joint  Total length of casing  Screen slot size  To of openings in screen  Diameter of borehole (in)  Diameter of borehole (in)  Z''  To of riser pipe (in)  Total Screen Interval	Riser coupling joint -	-		25 7 7 6					
Screen  Coupling joint screen to riser  Protective casing  Measurements  to .01 ft. (where applicable)  A the Top of Seal  Coupling joint screen to riser  Protective casing  Measurements  to .01 ft. (where applicable)  A the Total Seal Interval  A the Top of Seal  Coupling joint screen to ft. Top of Seal  A the Total Seal Interval  A the Top of Sand  Protective casing length  A the Top of Screen  Bottom of screen to end cap  Top of screen to first joint  Total length of casing  Screen slot size  A of openings in screen  Diameter of borehole (in)  Diameter of borehole (in)  B "  -B the Bottom of Screen  The Bottom of Borehole  The Bottom of Borehole  The Bottom of Borehole	Riser pipe above w.L.			504 40					
Coupling joint screen to riser  Protective casing  Measurements to .01 ft. (where applicable)  Significant pipe length  G' (Aush Mount)  Screen length  For total Seal Interval  A ft. Total Seal Interval  Fig. Top of Sand  Frotective casing length  I' (Aush Mount)  Screen length  Bottom of screen to end cap  Top of screen to first joint  Total length of casing  Screen slot size  Tof openings in screen  Diameter of borehole (in)  Bottom of Screen  Diameter of borehole (in)  Bottom of Screen  To of riser pipe (in)  Fig. Top of Seal  Fig. Top of Seal	Riser pipe below w.t.								
Protective casing  Measurements  to .01 ft. (where applicable)  5. ft. Total Seal Interval  6. ft. Top of Seal  7. ft. Top of Seal  7. ft. Top of Seal  8. ft. Total Seal Interval  8. ft. Top of Sand  8. ft. Top of Sand  8. ft. Top of Sand  8. ft. Top of Screen  9. ft. Top of Screen  9. ft. Top of Screen  10. ft. Top of Screen  11. ft. Total Screen Interval  12. ft. Total Screen Interval  13. ft. Total Screen Interval  14. ft. Total Screen Interval  15. ft. Total Screen Interval  16. ft. Total Screen Interval  17. ft. Total Screen Interval  18. ft. Total Screen Interval  19. ft. Total Screen Interval  19. ft. Total Screen Interval  10. ft. Bottom of Screen  10. ft. Bottom of Borehole  10. ft. Bottom of Borehole	Screen		A 14. 14. 1		3. 4.2.4				
Measurements to .01 ft. (where applicable)    Ft. Top of Seal	Coupling joint screen to rise	F . TI	e table	and the same of the same of					
Measurements  to .01 ft. (where applicable)  5. ft. Total Seal Interval  Riser pipe length  Protective casing length  1' (ftws# Mount)  Screen length  Bottom of screen to end cap  18'  Top of screen to first joint  Total length of casing  Screen slot size  **Co openings in screen  Diameter of borehole (in)  10'  11'  12'  12'  13'  14. Total Screen Interval  15. ft. Total Screen Interval  16. Total Screen Interval  17. Total Screen Interval  18. ft. Total Screen Interval  19. ft. Bottom of Screen  10. of openings in screen  10. of openings in screen  11. Total Screen Interval  12. Interval  13. Interval  14. Total Screen Interval  15. ft. Total Screen Interval  16. Interval  17. Interval  18. Interval  18. Interval  19.	Protective casing								
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Bottom of screen to end cap  Top of screen to first joint  Total length of casing  Screen slot size  % of openings in screen  Diameter of borehole (in)  B"  -10 ft. Bottom of Screen  LD of riser pipe (in)  Total Screen Interval  -10 ft. Bottom of Screen  -20 ft. Bottom of Borehole	Protective casing length		-	MATERIAL PROPERTY AND ADDRESS OF THE PARTY O		12	199		점하는 이번 조건이에서 없었다면 하나요? [6] 하는 경기 요하는 는 바로 없는 것이 없어 그래?
Bottom of screen to end cap  Top of screen to first joint  Total length of casing  Screen slot size  % of openings in screen  Diameter of borehole (in)  B"  -10 ft. Bottom of Screen  LD of riser pipe (in)  Total Screen Interval  -10 ft. Bottom of Screen  -20 ft. Bottom of Borehole	Screen length				rum con to	1.5	1:5		2 ft. Top of Screen
Top of screen to first joint  Total length of casing  Screen slot size  % of openings in screen  Diameter of borehole (in)  B"  -18 ft. Bottom of Screen  1D of riser pipe (in)  ft. Bottom of Borehole	CONTRACTOR OF THE PROPERTY OF					E	7:5		
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ID of riser pipe tim	Diameter of borehole (in)	1000	_	7 7 7 7 7 7		1 (E	₹5.	-18	
	ID of riser pipe (in)	723 34	2"					=20	ft. Bottom of Borehole
Completed by: J. Docas Surveyed by: K. TAHGHIGHE Ill registration #	المراجع المراج		of A.t.lx						
	Completed by: J. Do	ertaria la	eller ale		Salar are	tu. Weshir to	11 7.5	CONTRACTOR	April 1

Site Name: Nation								MW-6
Drilling Contractor: Bur	Q Q							
								Completed: 3/12/92
Drilling Method: 145A	4 1/2	" ID	) <u>.</u>		Drill	ing Fluids	(type):	
Annular Space Detai	ls							s01 ft.
Type of Surface Seal:				- /-	I	司		MSL Top of Protective Casin MSL Top of Riser Pipe ft Casing Stickup
Type of Annular Sealant:	Gilinound	L BANT	ONITE	_	T	YTT		in casing stickup
Amount of cement: # of				_	60	0		MSL Ground Surface
Amount of bentonite: #					4	1		ft. Top of annular sealant
					24	0		
Type of Bentonite Seal (Gran	nular, Peilet	U:	ankini		8	100		
Amount of bentonite: # of Ba						No West State of Wales		
Type of Sand Pack: 10-	20 5	silica	Sand					
Source of Sand: COLOR				1				
Amount of Sand: # of ba								
Well Construction Ma	terials							
	9	•	1 4					
	Туре	Type	Type	Туре				
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	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type				
Riser coupling joint	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type				
Riser coupling joint Riser pipe above w.t.	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type				
	Stainless Steel Specify Type	Teflon Specify Type		Other Specify Type				
Riser pipe above w.t. Riser pipe below w.t. Screen		Teflon Specify Type		Other Specify Type				
Riser pipe above w.t. Riser pipe below w.t. Screen		Teflon Specify Type	Sc.+ 40	Other Specify Type				
Riser pipe above w.t. Riser pipe below w.t.		Teflon Specify Type	Sc.+ 40	Other Specify Type				
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Riser pipe above w.t.  Riser pipe below w.t.  Screen  Coupling joint screen to riser  Protective casing  Measurements  Riser pipe length  Protective casing length		Teflon Specify	ScH 40	blei		\$\$\tag{\$\text{\$\tex{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\}\$\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{\$\text{	4	ft. Total Seal Interval  ft. Top of Sand
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Driller: J. DOLAN	J		Geologist: _	K. 7	AHG	HIC	:41	Date	Complete	d: 3/12/	92
Drilling Method: 45A	41/	4 ]	T. D.			Drillin	g Fluids	(type):			
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Amount of bentonite: #	of bags	lbs.	per bag	-	4		D. A.Was		ft.	Top of annu	ar sealant
Type of Bentonite Seal (Gran	nular, Peile	t): GRA	UULA2	_			7.7.2				
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Type of Sand Pack:				59							
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Source of Sand: COLOR	450					1					
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APPENDIX D

Laboratory Data

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS 4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: Burlington Environmental Date: August 24, 1992

Engineering

Report On: Analysis of Water & Soil Lab No: 26374

Page 1 of 9

IDENTIFICATION:

Samples received on 08-14-92

Project: 626121 National Guard Toppenish

ANALYSIS:

Client ID: MW4-W1 (water) Lab No. 26374-1

WTPH-D

Date Extracted: 8-18-92 Date Analyzed: 8-21-92

0.79 Diesel, mg/l

(> C12 - C24)

SURROGATE RECOVERY, % X9 o-terphenyl

Client ID: MW5-W1 (water) Lab No. 26374-2

WTPH-D

Date Extracted: 8-18-92 Date Analyzed: 8-21-92

1.0 Diesel, mg/l

(> C12 - C24)

SURROGATE RECOVERY, % o-terphenyl X9

Burlington Environmental - Engineering Project: 626121 Page 2 of 9 Lab No. 26374 August 24, 1992

Lab No. 26374-3

Client ID: MW6-W1 (water)

WTPH-D

Date Extracted: 8-18-92 Date Analyzed: 8-21-92

Diesel, mg/l

0.62

(> C12 - C24)

SURROGATE RECOVERY, %
o-terphenyl

50

Lab No. 26374-4

Client ID: MW7-W1 (water)

WTPH-D

Date Extracted: 8-18-92 Date Analyzed: 8-21-92

Diesel, mg/l

0.62

(> C12 - C24)

SURROGATE RECOVERY, %

o-terphenyl

78

Burlington Environmental - Engineering

Project: 626121

Page 3 of 9 Lab No. 26374 August 24, 1992

Lab No. 26374-5

Client ID: MW4-W2 (water)

BTEX by Method 8020 Date Analyzed: 8-21-92

Benzene, mg/l < 0.001 Toluene, mg/l < 0.001 Ethyl Benzene, mg/l < 0.001 Xylenes, mg/l < 0.001

#### SURROGATE RECOVERY, %

Trifluorotoluene 72

Lab No. 26374-6

Client ID: MW5-W2 (water)

BTEX by Method 8020 Date Analyzed: 8-21-92

Benzene, mg/l < 0.001
Toluene, mg/l < 0.001
Ethyl Benzene, mg/l < 0.001
Xylenes, mg/l < 0.001

#### SURROGATE RECOVERY, &

Trifluorotoluene 65

Burlington Environmental - Engineering

Project: 626121

Page 4 of 9 Lab No. 26374 August 24, 1992

Lab No. 26374-7

Client ID: MW6-W2 (water)

BTEX by Method 8020 Date Analyzed: 8-21-92

Benzene, mg/l < 0.001 Toluene, mg/l < 0.001 Ethyl Benzene, mg/l < 0.001 Xylenes, mg/l < 0.001

#### SURROGATE RECOVERY, %

Trifluorotoluene 74

Lab No. 26374-8 Client ID: MW7-W2 (water)

BTEX by Method 8020 Date Analyzed: 8-21-92

Benzene, mg/l < 0.001 Toluene, mg/l < 0.001 Ethyl Benzene, mg/l < 0.001 Xylenes, mg/l < 0.001

#### SURROGATE RECOVERY, %

Trifluorotoluene 76

Burlington Environmental - Engineering

Project: 626121

Page 5 of 9 Lab No. 26374 August 24, 1992

> ICP Metals Per Method 6010 Date Digested: 8-18-92 Date Analyzed: 8-20-92

Lab Sample No.	Client	ID	Total	Lead,	mg/l
9	MW4-W3	(water)		0.10	
10	MW5-W3	(water)		0.29	
11	MW6-W3	(water)		0.13	

GFAA Metals Per 7000 Series Methods

Date Digested: 8-18-92 Date Analyzed: 8-20-92

Lab Sample No.	Client ID	Total Lead, mg/l
12	MW7-W3 (water)	0.012

Burlington Environmental - Engineering Project: 626121
Page 7 of 9
Lab No. 26374
August 24, 1992

Lab No. 26374-15

Client ID: MW3-S1 (soil)

WTPH-D

Date Extracted: 8-18-92 Date Analyzed: 8-21-92

Diesel, mg/kg

9,900

(> C12 - C24)

SURROGATE RECOVERY, %
o-terphenyl

X8

Lab No. 26374-16

Client ID: MW4-S1 (soil)

WTPH-D

Date Extracted: 8-18-92 Date Analyzed: 8-21-92

Diesel, mg/kg

26

(> C12 - C24)

SURROGATE RECOVERY, %

o-terphenyl

64

Burlington Environmental - Engineering

Project: 626121

Page 6 of 9 Lab No. 26374 August 24, 1992

Lab No. 26374-13

Client ID: MW1-S1 (soil)

WTPH-D

Date Extracted: 8-18-92 Date Analyzed: 8-21-92

Diesel, mg/kg

12

(> C12 - C24)

SURROGATE RECOVERY, %

o-terphenyl

77

Lab No. 26374-14

Client ID: MW2-S1 (soil)

WTPH-D

Date Extracted: 8-18-92 Date Analyzed: 8-21-92

Diesel, mg/kg

24

(> C12 - C24)

SURROGATE RECOVERY, %

o-terphenyl

50

Burlington Environmental - Engineering Project: 626121 Page 8 of 9 Lab No. 26374

August 24, 1992

Lab No. 26374-17

Client ID: MW5-S1 (soil)

WTPH-D

Date Extracted: 8-18-92 Date Analyzed: 8-21-92

Diesel, mg/kg

57

(> C12 - C24)

SURROGATE RECOVERY, %
o-terphenyl

74

Lab No. 26374-18

Client ID: MW6-S1 (soil)

WTPH-D

Date Extracted: 8-18-92 Date Analyzed: 8-21-92

Diesel, mg/kg

15

(> C12 - C24)

SURROGATE RECOVERY, %

o-terphenyl

75

Lab No. 26374-19

Client ID: MW7-S1 (soil)

WTPH-D

Date Extracted: 8-18-92 Date Analyzed: 8-21-92

Diesel, mg/kg

29

(> C12 - C24)

SURROGATE RECOVERY, %

o-terphenyl

74

Burlington Environmental - Engineering

Project: 626121

Page 9 of 9 Lab No. 26374 August 24, 1992

> ICP Metals Per Method 6010 Date Digested: 8-18-92 Date Analyzed: 8-20-92

Lab Sample No.	Client ID	Total Lead, mg/kg
20	MW1-S2 (soil)	11
21	MW2-S2 (soil)	9.2
22	MW3-S2 (soil)	7.4
23	MW4-S2 (soil)	8.7
24	MW5-S2 (soil)	9.0
25	MW6-S2 (soil)	7.9
26	MW7-S2 (soil)	8.7

GFAA Metals Per 7000 Series Methods

Date Digested: 8-18-92 Date Analyzed: 8-20-92

Lab Sample No.	Client ID	Dissolved Lead, mg/l
27	MW4-W4 (water)	< 0.005
28	MW5-W4 (water)	< 0.005
29	MW6-W4 (water)	< 0.005
30	MW7-W4 (water)	< 0.005

SOUND ANALYTICAL SERVICES

MARTY FRENCH

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS 4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

#### QUALITY CONTROL REPORT BTEX by EPA SW-846 Method 8020

Client: Burlington Environmental - Engineering Lab No: 26374qc1

Matrix: Water

Units:

mq/1

Date:

August 24, 1992

METHOD BLANK

HILIMOD	2241111
Parameter	Blank Value
Benzene Toluene Ethyl Benzene Xylenes	< 0.001 < 0.001 < 0.001 < 0.001
SURROGATE RECOVERY, % Trifluorotoluene	87

#### DUPLICATE

Dup No 26374-5

Parameter	Sample (S)	Duplicate (D)	RPD
Benzene	< 0.001	< 0.001	0.0
Toluene	< 0.001	< 0.001	0.0
Ethyl Benzene	< 0.001	< 0.001	0.0
Xylenes	< 0.001	< 0.001	0.0
SURROGATE RECOVERY, % Trifluorotoluene	72	74	

RPD = Relative Percent Difference  $= [(S - D) / ((S + D) / 2] \times 100$ 

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS
4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

#### QUALITY CONTROL REPORT

WTPH-D (Diesel Range Organics)

Client: Burlington Environmental

Lab No: 26374qc2 Matrix: Soil

Units: mg/kg

Date: August 24, 1992

#### DUPLICATE

Parameter	Sample (S)	Duplicate (D)	RPD
Diesel (>C <sub>12</sub> ·C <sub>24</sub> )	29	26	11.0
SURROGATE RECOVERY, % o-terphenyl	74	75	

RPD = Relative Percent Difference  
= 
$$[(S - D) / ((S + D) / 2] \times 100$$

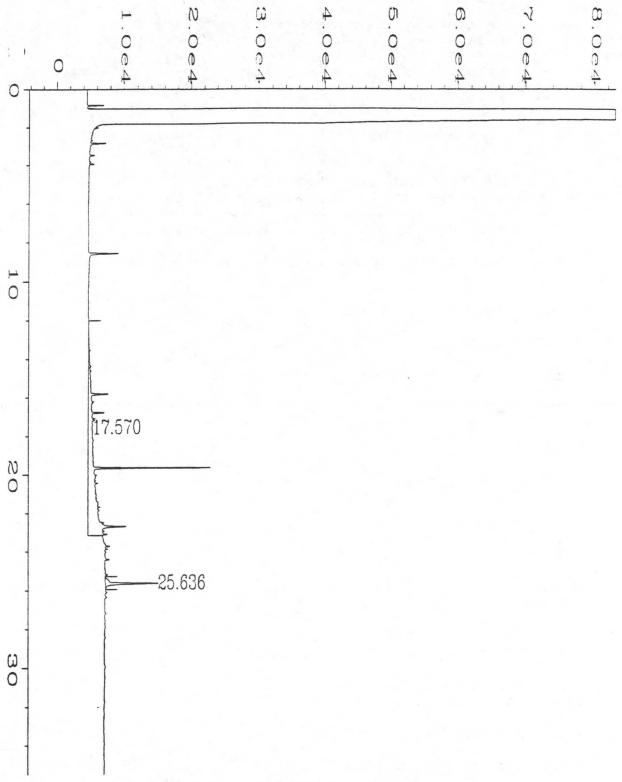
#### METHOD BLANK

Parameter	Blank Value
Diesel	< 25
SURROGATE RECOVERY, % o-terphenyl	74

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS
4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

#### DATA QUALIFIER FLAGS

- ND: Indicates that the analyte was analyzed for but was not detected. The associated numerical value is the practical quantitation limit, corrected for sample dilution.
- J: The analyte was analyzed for and positively identified, but the associated numerical value is an estimated quantity.
- C: The identification of this analyte was confirmed by GC/MS.
- B: This analyte was also detected in the associated method blank. There is a possibility of blank contamination.
- E: The concentration of this analyte exceeded the instrument calibration range.
- D: The reported result for this analyte is calculated based on a secondary dilution factor.
- A: This TIC is a suspected aldol-condensation product.
- M: Quantitation Limits are elevated due to matrix interferences.
- S: The calibration quality control criteria for this compound were not met. The reported concentration should be considered an estimated quantity.
- X1: Contaminant does not appear to be "typical" product. Elution pattern suggests it may be
- X2: Contaminant does not appear to be "typical" product. Further testing is suggested for identification.
- X3: Identification and quantification of peaks was complicated by matrix interference; GC/MS confirmation is recommended.
- X4: RPD for duplicates outside QC limits. Sample was re-analyzed with similar results. Sample matrix is nonhomogeneous.
- X4a: RPD for duplicates outside QC limits due to analyte concentration near the method practical quantitation limit/detection limit.
- X5: Matrix spike was diluted out during analysis.
- X6: Recovery of matrix spike outside QC limits. Sample was re-analyzed with similar results.
- X7: Recovery of matrix spike outside QC limits. Matrix interference is indicated by blank spike recovery data.
- X8: Surrogate was diluted out during analysis.
- X9: Surrogate recovery outside QC limits due to matrix composition.
- X10: Surrogate recovery outside QC limits due to high contaminant levels.

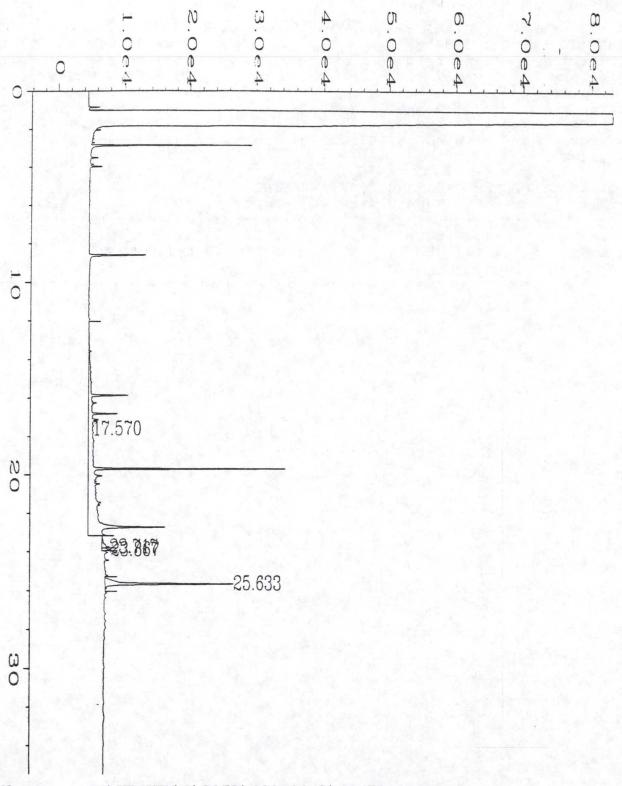


```
: C:\HPCHEM\1\DATA\082092_A\025F0101.D
Data File Name
                                               Page Number
Operator
                 : DAS/DMW
                                               Vial Number
                                                               : 25
Instrument
                 : HP 5890
                                               Injection Number: 1
Sample Name
                 : 26374-1
                                               Sequence Line
                                                             : 1
Run Time Bar Code:
Acquired on : 21 Aug 92 12:50 PM
                                               Instrument Method: O-TERPH.MTH
                                               Analysis Method : HP5890-1.MTH
Report Created on: 24 Aug 92 12:01 PM
Last Recalib on : 24 AUG 92 09:09 AM
                                               Sample Amount
                                               ISTD Amount
Multiplier
```

External	Standard Report
Data File Name : C:\HPCHEM\1\DATA\ Operator : DAS/DMW Instrument : HP 5890 Sample Name : 26374-1 Run Time Bar Code: Acquired on : 21 Aug 92 12:50 Report Created on: 24 Aug 92 12:02 Last Recalib on : 24 AUG 92 09:09 AUMultiplier : 1	Page Number : 1 Vial Number : 25 Injection Number : 1 Sequence Line : 1 Instrument Method: O-TERPH.MTH Analysis Method : HP5890-1.MTH
Sig. 1 in C:\HPCHEM\1\DATA\082092_A\082	
17.570 567628 PH + 0.000 1	49.827 wd hcid diesel

## External Standard Report

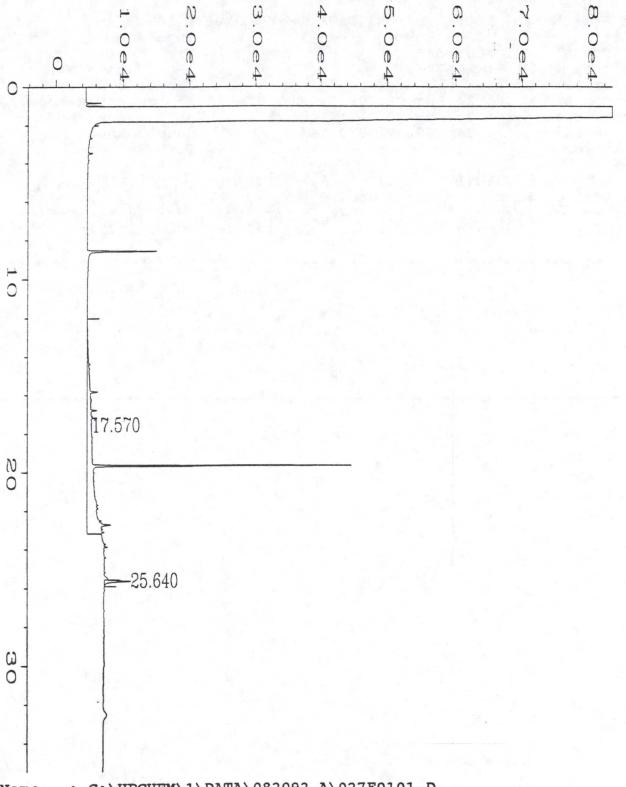
Data File Name	: C:\HPCH	EM\1\DA	ATA\082	092 A\02	5F0101.D	
Operator	: DAS/DMW				Page Number :	1
Instrument					Vial Number :	25
Sample Name	26374-1				Injection Number :	
Run Time Bar Code					Sequence Line :	
Acquired on	21 Aug	92 12:	50 PM		Instrument Method:	
Report Created on					Analysis Method :	
Last Recalib on	19 AUG	92 07:2	22 AM			0
Multiplier	: 1				ISTD Amount :	
Sig. 1 in C:\HPCH	מיח ברו אינ	\ 082093	<b>A</b> \025	E0101 D		
Ret Time Area					Name	
			1 '	24.326	1-Cloctane	
	1403 BB		1		o-Terphenvl	



```
Data File Name
                : C:\HPCHEM\1\DATA\082092_A\026F0101.D
Operator
                : DAS/DMW
                                              Page Number
                                                               : 1
Instrument
                : HP 5890
                                              Vial Number
                                                               : 26
Sample Name
                : 26374-2
                                              Injection Number: 1
Run Time Bar Code:
                                              Sequence Line
                                                             : 1
Acquired on : 21 Aug 92 01:32 PM
                                              Instrument Method: O-TERPH.MTH
                                              Analysis Method : HP5890-1.MTH
Report Created on: 24 Aug 92
                             12:03 PM
                                              Sample Amount
Last Recalib on : 24 AUG 92 09:09 AM
Multiplier
                                              ISTD Amount
```

Data File Name :	C:\HPCHEM\1\DATA\082092_A\02	6F0101.D	
	DAS/DMW	Page Number : 1	
Instrument :		Vial Number : 2	
Sample Name :	26374-2	Injection Number: 1	A to the second
Run Time Bar Code:		Sequence Line : 1	
Acquired on :	21 Aug 92 01:32 PM	Instrument Method: 0	-TERPH.MTH
Report Created on:	24 Aug 92 12:03 PM	Analysis Method : H	P5890-1.MTF
Last Recalib on :	24 AUG 92 09:09 AM	Sample Amount : 0	
Multiplier :	1	ISTD Amount :	
	M\1\DATA\082092_A\026F0101.D Type Width Ref# ng/ul	Name	
17 570 6645	519 PH + 0.000 1 63.179	wd haid diesel	

External Standard	Report
Data File Name : C:\HPCHEM\1\DATA\082092_A\ Operator : DAS/DMW Instrument : HP 5890 Sample Name : 26374-2 Run Time Bar Code: Acquired on : 21 Aug 92 01:32 PM Report Created on: 22 Aug 92 11:28 AM Last Recalib on : 19 AUG 92 07:22 AM Multiplier : 1	Page Number : 1 Vial Number : 26 Injection Number : 1 Sequence Line : 1 Instrument Method: O-TERPH.MTH Analysis Method : O-TERPH.MTH Sample Amount : 0 ISTD Amount :
Sig. 1 in C:\HPCHEM\1\DATA\082092_A\026F0101.	Name
8.565 25810 BB 0.047 1 34.34 19.655 74936 BB 0.039 1 36.94	10 1-Cloctane 19 o-Terphenyl



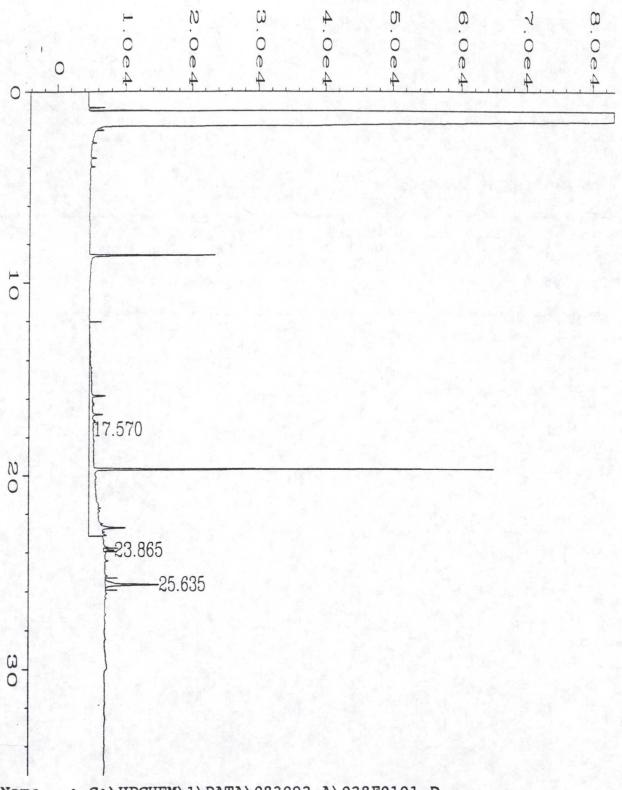
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: C:\HPCHEM\1\DATA\082092_A\027F0101.D
Data File Name
                                                Page Number
                                                                 : 1
Operator
                 : DAS/DMW
                                                Vial Number
                                                                 : 27
Instrument
                 : HP 5890
                                                Injection Number: 1
Sample Name
                 : 26374-3
                                                                : 1
Run Time Bar Code:
                                                Sequence Line
                : 21 Aug 92 02:15 PM
                                                Instrument Method: O-TERPH.MTH
Acquired on
Report Created on: 24 Aug 92 12:04 PM
                                                Analysis Method : HP5890-1.MTH
Last Recalib on : 24 AUG 92 09:09 AM
                                                Sample Amount
                                                                 : 0
                                                ISTD Amount
Multiplier
                 : 1
```

Ex	cternal Standard Rep	port	
Data File Name : C:\HPCHEM\ Operator : DAS/DMW Instrument : HP 5890 Sample Name : 26374-3 Run Time Bar Code: Acquired on : 21 Aug 92 Report Created on: 24 Aug 92 Last Recalib on : 24 AUG 92 Multiplier : 1	12:04 PM	Page Number Vial Number Injection Number Sequence Line Instrument Method: Analysis Method	: 1 : 1 : O-TERPH.MTH
Sig. 1 in C:\HPCHEM\1\DATA\08 Ret Time Area Type Widelight		Name	

#### External Standard Report

Data File Name :	C:\HPCHEM\1\DATA\082092_A\02	7F0101.D
	DAS/DMW	Page Number : 1
Instrument :	HP 5890	Vial Number : 27
Sample Name :	26374-3	Injection Number: 1
Run Time Bar Code:		Sequence Line : 1
Acquired on :	21 Aug 92 02:15 PM	Instrument Method: O-TERPH.MTH
	24 Aug 92 01:50 PM	Analysis Method : O-TERPH.MTH
Last Recalib on :	19 AUG 92 07:22 AM	Sample Amount : 0
Multiplier :	1	ISTD Amount :
Sig. 1 in C:\HPCHEN	M\1\DATA\082092_A\027F0101.D	
Ret Time Area	Type Width Ref# ng/ul	Name
0.566		1-Cleatane
	929 BB 0.048 1 39.550	
19.654 1005	565 MM 0.042 1 50.174	o-Terphenyl

User Modified



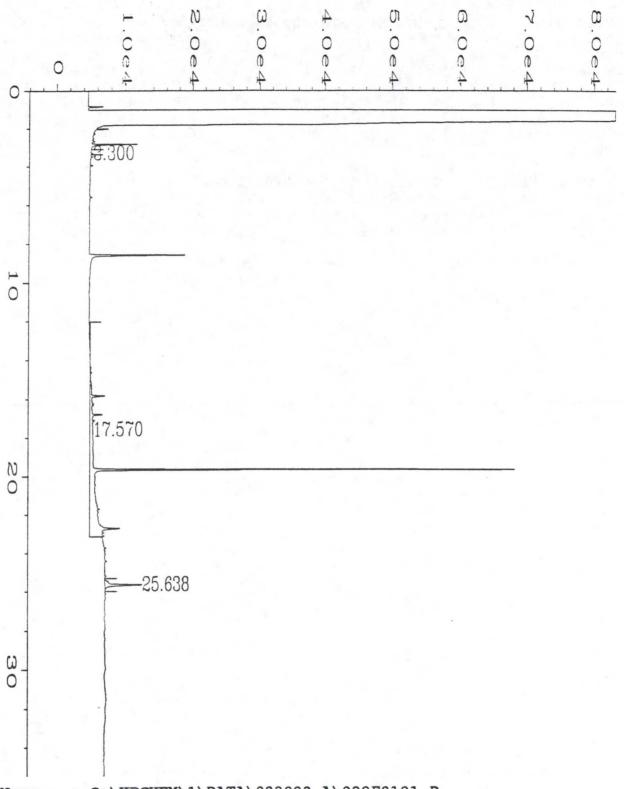
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Data File Name : C:\HPCHEM\1\DATA\082092_A\028F0101.D
Operator
                                                Page Number
                 : DAS/DMW
                                                Vial Number
Instrument
                 : HP 5890
                                                                : 28
                                                Injection Number: 1
Sample Name
                 : 26374-4
Run Time Bar Code:
                                                Sequence Line
                                                                : 1
                                                Instrument Method: O-TERPH.MTH
Acquired on
                : 21 Aug 92 02:59 PM
                                                Analysis Method : HP5890-1.MTH
Report Created on: 24 Aug 92 12:05 PM
                                                Sample Amount
Last Recalib on : 24 AUG 92 09:09 AM
                                                ISTD Amount
Multiplier
                 : 1
```

External	Standard	Report
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17.570 655251 PH + 0.000 1 61.902 wd hcid diesel

## External Standard Report

Sig. 1 in	C: \HPCHEM\1	\DATA'	082092	2_A\028	3F0101.D	
Ret Time	Area	Type	Width	Ref#	ng/ul	Name
8.562	56003	BB	0.045	1	60.046	1-Cloctane
19.653	155004	BB	0.039	1	78.265	o-Terphenyl



```
: C:\HPCHEM\1\DATA\082092_A\029F0101.D
Data File Name
                                                Page Number
Operator
                 : DAS/DMW
                                                Vial Number
                                                                 : 29
Instrument
                 : HP 5890
                                                Injection Number: 1
Sample Name
                 : 26374-13
                                                Sequence Line
Run Time Bar Code:
                 : 21 Aug 92 03:43 PM
                                                Instrument Method: O-TERPH.MTH
Acquired on
                                                Analysis Method : HP5890-1.MTH
Report Created on: 24 Aug 92 12:06 PM
Last Recalib on : 24 AUG 92 09:09 AM
                                                Sample Amount
                                                ISTD Amount
Multiplier
```

External Standard Re	port
Data File Name : C:\HPCHEM\1\DATA\082092 A\02	9F0101.D
Operator : DAS/DMW	Page Number : 1
Instrument : HP 5890	Vial Number : 29
Sample Name : 26374-13	Injection Number: 1
Run Time Bar Code:	Sequence Line : 1
Acquired on : 21 Aug 92 03:43 PM	Instrument Method: O-TERPH.MTH
Report Created on: 24 Aug 92 12:06 PM	Analysis Method : HP5890-1.MT
Last Recalib on : 24 AUG 92 09:09 AM	Sample Amount : 0
Multiplier : 1	ISTD Amount :
Sig. 1 in C:\HPCHEM\1\DATA\082092 A\029F0101.D	
Ret Time Area Type Width Ref# ng/ul	Name
17.570 510838 PH + 0.000 1 42.000	wd hcid diesel

Data File Name : C:\HPCHEM\1\DATA\082092\_A\029F0101.D Operator : DAS/DMW Instrument : HP 5890 Sample Name : 26374-13 Page Number : 1 Vial Number : 29 Injection Number: 1 Run Time Bar Code:

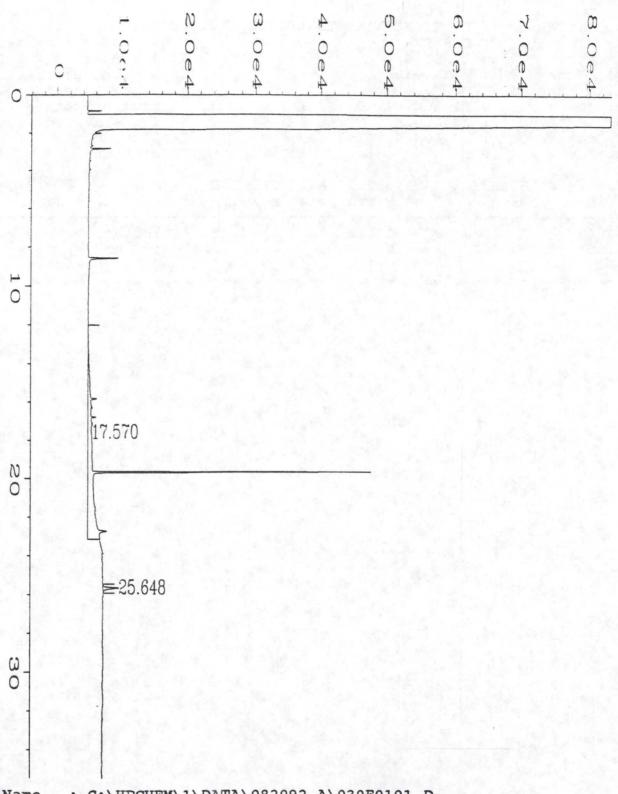
Sequence Line : 1
Instrument Method: O-TERPH.MTH
Analysis Method : O-TERPH.MTH Acquired on : 21 Aug 92 03:43 PM Report Created on: 22 Aug 92 11:40 AM

Sample Amount : 0
ISTD Amount : Last Recalib on : 19 AUG 92 07:22 AM Multiplier

Sig. 1 in C:\HPCHEM\1\DATA\082092\_A\029F0101.D

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Ret Time	Area	Type	Width	Ref#	ng/ul	Name
8.563	43831	BB	0.048	1	49.684	1-Cloctane
19.654	152770	BB	0.037	1	77.112	o-Terphenyl



```
Data File Name
                 : C:\HPCHEM\1\DATA\082092_A\030F0101.D
Operator
                 : DAS/DMW
                                               Page Number
                                                                : 1
                                               Vial Number
Instrument
                                                                : 30
                 : HP 5890
Sample Name
                                               Injection Number: 1
                 : 26374-14
Run Time Bar Code:
                                               Sequence Line
                                                                : 1
             : 21 Aug 92 04:26 PM
Acquired on
                                               Instrument Method: O-TERPH.MTH
Report Created on: 24 Aug 92 12:07 PM
                                               Analysis Method : HP5890-1.MTH
                                               Sample Amount
Last Recalib on : 24 AUG 92 09:09 AM
Multiplier
                                               ISTD Amount
```

External Standard	Report
Data File Name : C:\HPCHEM\1\DATA\082092_A\ Operator : DAS/DMW Instrument : HP 5890 Sample Name : 26374-14 Run Time Bar Code: Acquired on : 21 Aug 92 04:26 PM Report Created on: 24 Aug 92 12:08 PM Last Recalib on : 24 AUG 92 09:09 AM Multiplier : 1	Page Number : 1 Vial Number : 30 Injection Number : 1 Sequence Line : 1 Instrument Method: O-TERPH.MTH Analysis Method : HP5890-1.MTH Sample Amount : 0 ISTD Amount :
Sig. 1 in C:\HPCHEM\1\DATA\082092_A\030F0101. Ret Time Area Type Width Ref# ng/ul	Name
17.570 529465 PH + 0.000 1 44.5	67 wd hcid diesel

1	External	Standard	Report
		D CHILLIANT A	MCDOTC

Data File Name : C:\HPCHEM\1\DATA\082092\_A\030F0101.D

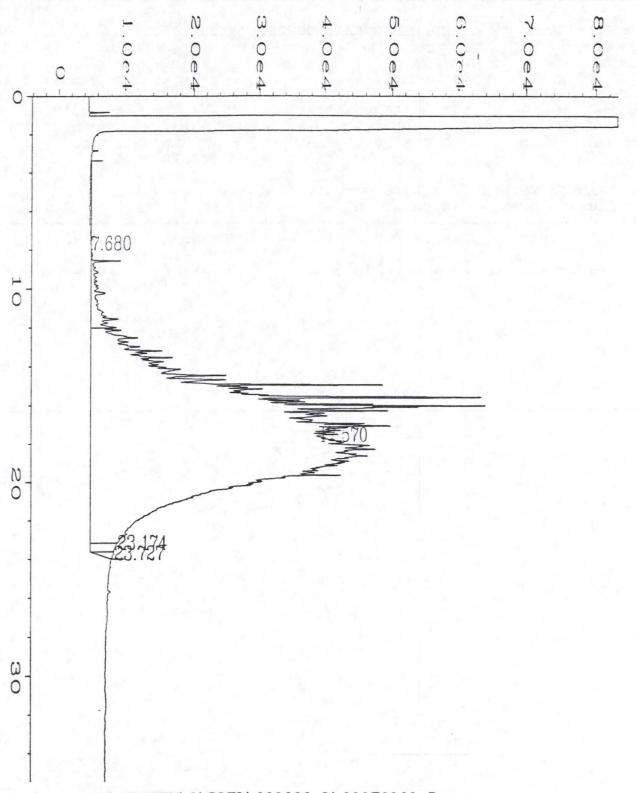
Operator : DAS/DMW Page Number
Instrument : HP 5890 Vial Number
Sample Name : 26374-14 Injection Page Number : 1
Vial Number : 30
Injection Number : 1 Sequence Line : 1 Run Time Bar Code:

Acquired on : 21 Aug 92 04:26 PM Instrument Method: O-TERPH.MTH
Report Created on: 24 Aug 92 02:14 PM Analysis Method : O-TERPH.MTH
Last Recalib on : 19 AUG 92 07:22 AM Sample Amount : 0

ISTD Amount Multiplier : 1

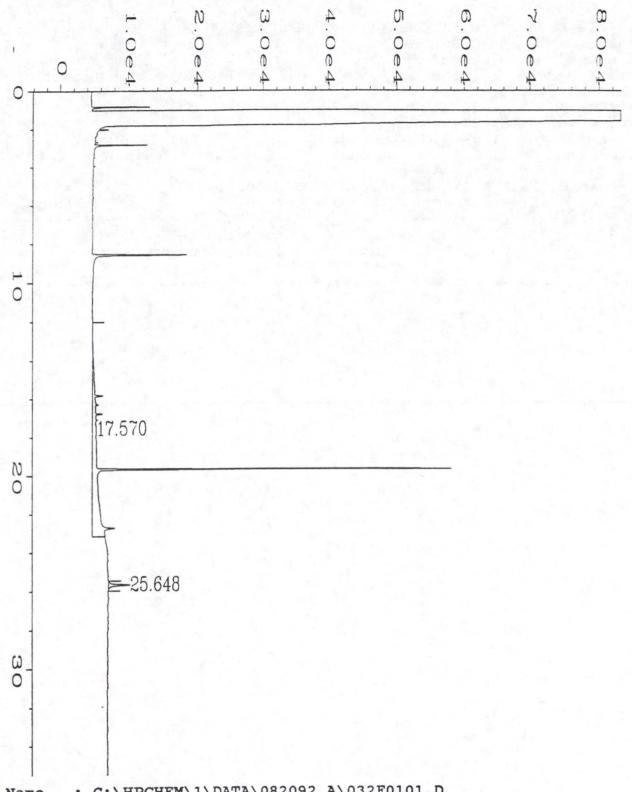
Sig. 1 in C:\HPCHEM\1\DATA\082092 A\030F0101.D

User Modified



```
: C:\HPCHEM\1\DATA\082092_A\031F0101.D
Data File Name
                 : DAS/DMW
                                               Page Number
                                                                : 1
Operator
                 : HP 5890
                                               Vial Number
                                                                : 31
Instrument
                                               Injection Number: 1
Sample Name
                 : 26374-15 1:5
                                               Sequence Line
                                                                : 1
Run Time Bar Code:
                 : 21 Aug 92 05:10 PM
                                               Instrument Method: O-TERPH.MTH
Acquired on
Report Created on: 24 Aug 92 12:08 PM
                                               Analysis Method : HP5890-1.MTH
Last Recalib on : 24 AUG 92 09:09 AM
                                               Sample Amount
                                                                : 0
                                               ISTD Amount
Multiplier
                 : 1
```

External Standard Report									
Operator :	C:\HPCHEM\1\DATA\082092_A\03 DAS/DMW HP 5890 26374-15 1:5	1F0101.D Page Number : Vial Number : Injection Number :	31						
Run Time Bar Code: Acquired on : Report Created on: Last Recalib on :	21 Aug 92 05:10 PM 24 Aug 92 12:09 PM 24 AUG 92 09:09 AM 1	Sequence Line Instrument Method: Analysis Method: Sample Amount: ISTD Amount:	1 O-TERPH.MTH HP5890-1.MTH						
Ret Time Area	M\1\DATA\082092_A\031F0101.D Type Width Ref# ng/ul 	Name							



```
: C:\HPCHEM\1\DATA\082092_A\032F0101.D
Data File Name
                                                 Page Number
Operator
                 : DAS/DMW
                 : HP 5890
                                                                  : 32
                                                 Vial Number
Instrument
                                                Injection Number:
                                                                    1
Sample Name
                 : 26374-16
                                                                 : 1
                                                Sequence Line
Run Time Bar Code:
                                                 Instrument Method: O-TERPH.MTH
                 : 21 Aug 92
                               05:54 PM
Acquired on
Report Created on: 24 Aug 92
                              12:09 PM
                                                Analysis Method : HP5890-1.MTH
Last Recalib on : 24 AUG 92 09:09 AM
                                                Sample Amount
                                                                  : 0
                                                ISTD Amount
Multiplier
                 : 1
```

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Data File Name : C:\HPCHEM\1\DATA\082092\_A\031F0101.D

Operator : DAS/DMW Page Number : 1

Instrument : HP 5890 Vial Number : 31

Sample Name : 26374-15 1:5 Injection Number : 1

Run Time Bar Code: Sequence Line : 1

Acquired on : 21 Aug 92 05:10 PM Instrument Method: O-TERPH.MTH
Report Created on: 22 Aug 92 11:41 AM Analysis Method : O-TERPH.MTH

Last Recalib on : 19 AUG 92 07:22 AM Sample Amount : 0
Multiplier : 1 ISTD Amount :

Sig. 1 in C:\HPCHEM\1\DATA\082092 A\031F0101.D

Ret Time	Area	Type	Width	Ref#	ng/ul	Name	
8.562	11577	BB	0.045	1	22.222	1-Cloctane	
19.654	29621	VV	0.045	1	13.565	o-Terphenyl	

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## External Standard Report \_\_\_\_\_\_\_

Data File Name : C:\HPCHEM\1\DATA\082092\_A\032F0101.D

Operator : DAS/DMW Page Num

Instrument : HP 5890 Vial Num

Sample Name : 26374-16 Injection Page Number : 1 Vial Number : 32 Injection Number: 1 Sequence Line: 1 Run Time Bar Code:

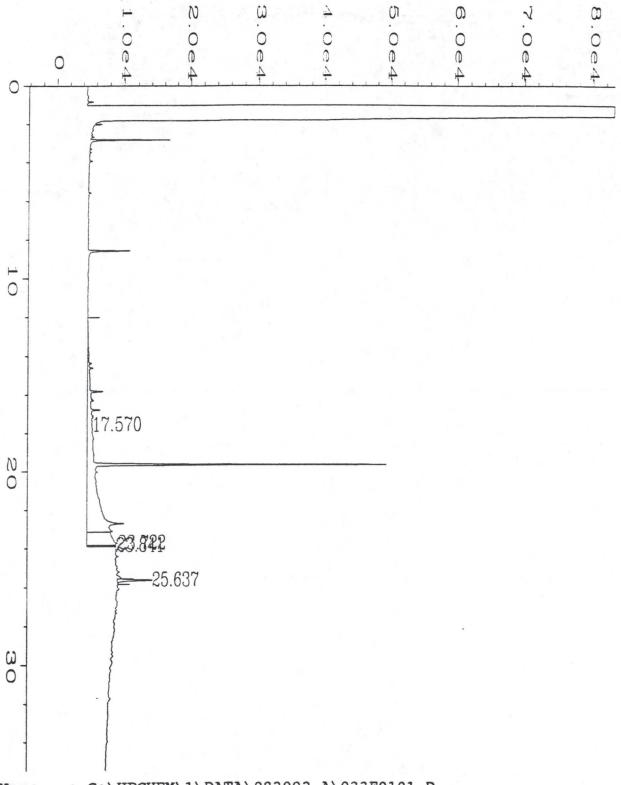
Acquired on : 21 Aug 92 05:54 PM Instrument Method: O-TERPH.MTH Report Created on: 22 Aug 92 11:41 AM Last Recalib on : 19 AUG 92 07:22 AM Analysis Method : O-TERPH.MTH Sample Amount : O

ISTD Amount

Multiplier : 1

Sig. 1 in	C:\HPCHEM\1	\DATA'	\082092_A\032F0101.D
			77: 31: D C   (-3

Ret	Time	Area	Type	Width	Ref#	ng/ul	Name
. 8	3.563	43391	BB	0.049	1	49.308	1-Cloctane
19	.656	126817	BB	0.037	1	63.720	o-Terphenyl



```
Data File Name
                 : C:\HPCHEM\1\DATA\082092_A\033F0101.D
                                                Page Number
                 : DAS/DMW
Operator
                                                                  : 1
                                                Vial Number
                                                                  : 33
Instrument
                 : HP 5890
                                                 Injection Number: 1
Sample Name
                 : 26374-17
Run Time Bar Code:
                                                 Sequence Line
                                                                  : 1
                                                Instrument Method: O-TERPH.MTH
Acquired on
                 : 21 Aug 92 06:37 PM
Report Created on: 24 Aug 92 12:11 PM
                                                Analysis Method : HP5890-1.MTH
                                                Sample Amount
Last Recalib on : 24 AUG 92 09:09 AM
                                                                  : 0
                                                ISTD Amount
Multiplier
```

External :	Standard	Report
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Data File Name : C:\HPCHEM\1\DATA\082092\_A\033F0101.D

Operator : DAS/DMW Page Num

Page Num Page Number : 1 Vial Number : 33 Instrument : HP 5890 Sample Name : 26374-17 Injection Number: 1 Run Time Bar Code: Sequence Line : 1

Acquired on : 21 Aug 92 06:37 PM Report Created on: 24 Aug 92 12:11 PM Instrument Method: O-TERPH.MTH Analysis Method: HP5890-1.MTH

Last Recalib on : 24 AUG 92 09:09 AM Sample Amount : 0 : 1 Multiplier ISTD Amount

Sig. 1 in C:\HPCHEM\1\DATA\082092\_A\033F0101.D

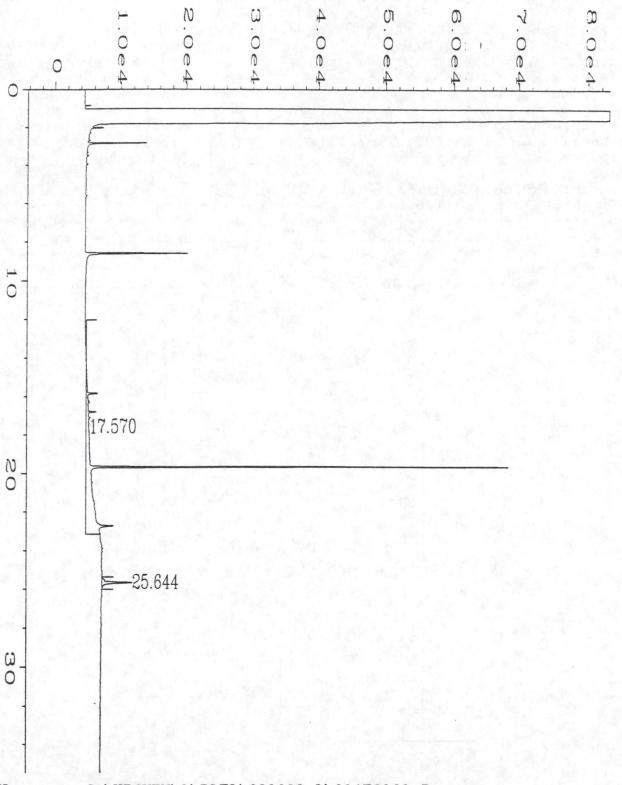
Ret Time Area Type Width Ref# ng/ul Name 17.570 819787 PH + 0.000 1 84.577 wd hcid diesel

Data File Name : C:\HPCHEM\1\DATA\082092\_A\033F0101.D

Operator : DAS/DMW Page Num
Instrument : HP 5890 Vial Num Page Number : 1 Vial Number : 33 Sample Name : 26374-17 Injection Number : 1 Sequence Line : 1 Run Time Bar Code:

Sig. 1 in C:\HPCHEM\1\DATA\082092 A\033F0101.D Ret Time Area Type Width Ref# ng/ul Name Name

8.567 18809 BB 0.048 1 28.380 1-Cloctane 19.656 147465 BB 0.048 1 74.375 o-Terphenyl



```
Data File Name : C:\HPCHEM\1\DATA\082092 A\034F0101.D
Operator
                                               Page Number
                 : DAS/DMW
Instrument
                                               Vial Number
                 : HP 5890
                                                                : 34
                                               Injection Number: 1
Sample Name
                 : 26374-18
                                                                : 1
Run Time Bar Code:
                                               Sequence Line
Acquired on
                 : 21 Aug 92 07:21 PM
                                               Instrument Method: O-TERPH.MTH
Report Created on: 24 Aug 92 12:12 PM
                                               Analysis Method : HP5890-1.MTH
                                               Sample Amount
Last Recalib on : 24 AUG 92 09:09 AM
                                               ISTD Amount
Multiplier
```

Eutown 1	Ctandard	Donont
External	Stallualu	Keport

Data File Name : C:\HPCHEM\1\DATA\082092\_A\034F0101.D Operator : DAS/DMW
Instrument : HP 5890
Sample Name : 26374-18 Page Number : 1 Vial Number : 34 Injection Number: 1 Run Time Bar Code:

Acquired on : 21 Aug 92 07:21 PM
Report Created on: 24 Aug 92 12:12 PM
Last Recalib on : 24 AUG 92 09:09 AM
Multiplier : 1

Sequence Line : 1
Instrument Method: O-TERPH.MTH
Analysis Method : HP5890-1.MTH
Sample Amount : 0
ISTD Amount : Sig. 1 in C:\HPCHEM\1\DATA\082092\_A\034F0101.D

## \_\_\_\_\_\_ External Standard Report

Data File Name : C:\HPCHEM\1\DATA\082092 A\034F0101.D

Operator : DAS/DMW
Instrument : HP 5890
Sample Name : 26374-18 Page Number : 1 Vial Number : 34 Injection Number: 1 Run Time Bar Code: Sequence Line : 1

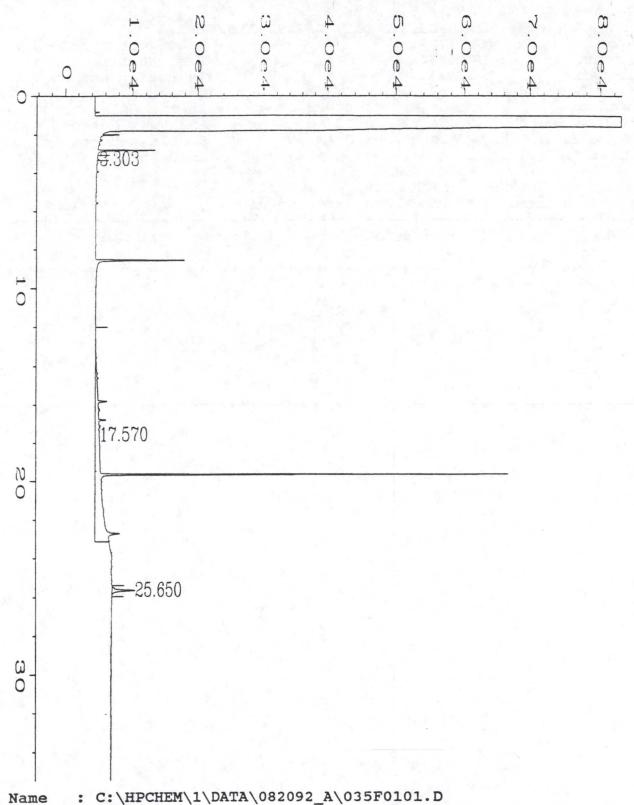
Acquired on : 21 Aug 92 07:21 PM Instrument Method: O-TERPH.MTH
Report Created on: 22 Aug 92 11:42 AM Analysis Method : O-TERPH.MTH
Last Recalib on : 19 AUG 92 07:22 AM Sample Amount : 0

ISTD Amount

Multiplier : 1

Sig. 1 in C:\HPCHEM\1\DATA\082092\_A\034F0101.D

Ret Time	Area	Type	Width	Rei#	ng/ul	Name
8.570	48379	BB	0.047	1	53.555	1-Cloctane
19.658	149074	BB	0.036	1	75.205	o-Terphenyl

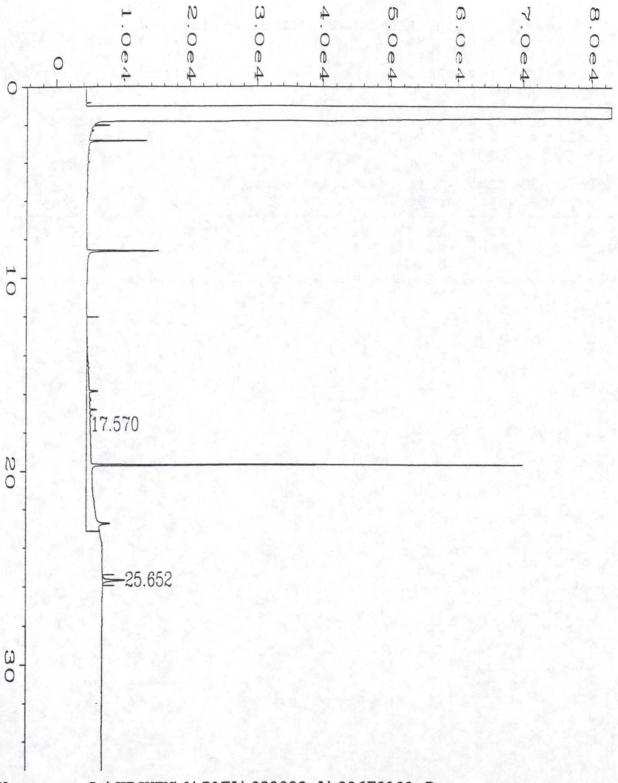


```
Data File Name
Operator
                 : DAS/DMW
                                                Page Number
                                                Vial Number
Instrument
                 : HP 5890
                                                Injection Number: 1
                 : 26374-19
Sample Name
                                                Sequence Line
                                                                 : 1
Run Time Bar Code:
                                                Instrument Method: O-TERPH.MTH
                 : 21 Aug 92 08:04 PM
Acquired on
                                                Analysis Method : HP5890-1.MTH
Report Created on: 24 Aug 92
Last Recalib on : 24 AUG 92 09:09 AM
                                                Sample Amount
                                                ISTD Amount
Multiplier
                 : 1
```

External Standard Report									
				\1\DATA	082092	_A\035F0101.D			
	DA.	S/DM	M			Page Number	:	1	
Instrument :	HP	5890	0			Vial Number	:	35	
Sample Name :	26	374-	19			Injection Number	:	1	
Run Time Bar Code:						Sequence Line		ī	
Acquired on :	21	Aug	92	08:04	PM	Instrument Method	1:	O-TERPH.MTH	
Report Created on:	24	Aug	92	12:13	PM	Analysis Method			
Last Recalib on :	24	AUG	92	09:09 7	MA	Sample Amount		0	
	1					ISTD Amount			

Sig. 1 ir	C:\HPCHEM\1	DATA'	\08209	2 A\03	5F0101.D	
Ret Time	Area	Type	Width	Ref#	ng/ul	Name
17 570	610831	DH +	0 000	1	55 791	ud haid diagol

Data File Name :	C:\HPCH	EM\1\D	ATA\08	2092_A\03	5F0101.D	
	DAS/DMW				Page Number	: 1
Instrument :	HP 5890				Vial Number	: 35
Sample Name :	26374-19	9			Injection Number	: 1
Run Time Bar Code:					Sequence Line	: 1
Acquired on :	21 Aug S	92 08	:04 PM		Instrument Method	: O-TERPH.MTH
Report Created on:					Analysis Method	: O-TERPH.MTH
Last Recalib on :	19 AUG	92 07:2	22 AM		Sample Amount	: 0
Multiplier :	1				ISTD Amount	•
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19.659 146	022 BB	0.036	1	73.630	o-Terphenyl	



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: C:\HPCHEM\1\DATA\082092_A\036F0101.D
Data File Name
Operator
                 : DAS/DMW
                                               Page Number
                                                                : 1
                 : HP 5890
                                               Vial Number
Instrument
                                                                : 36
                                               Injection Number: 1
Sample Name
                 : 26374-19D
                                               Sequence Line
Run Time Bar Code:
Acquired on
                 : 21 Aug 92 08:47 PM
                                               Instrument Method: O-TERPH.MTH
Report Created on: 24 Aug 92 12:14 PM
                                               Analysis Method : HP5890-1.MTH
                                               Sample Amount
Last Recalib on : 24 AUG 92 09:09 AM
                                               ISTD Amount
Multiplier
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External Standard	Report	
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Data File Name : C:\HPCHEM\1\DATA\082092\_A\036F0101.D

Operator : DAS/DMW Page Number : 1

Instrument : HP 5890 Vial Number : 36

Sample Name : 26374-19D Injection Number : 1

Run Time Bar Code: Sequence Line : 1 Acquired on : 21 Aug 92 08:47 PM Instrument Method: O-TERPH.MTH
Report Created on: 24 Aug 92 12:14 PM Analysis Method : HP5890-1.MTH
Last Recalib on : 24 AUG 92 09:09 AM Sample Amount : 0
Multiplier : 1 ISTD Amount :

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# APPENDIX E

Analytical Data Review

### MEMORANDUM

DATE: September 10, 1992

TO: Chip Goodhue, Hydrogeologist - Technical Services

FROM: Nels Cone, Chemist - Technical Services

SUBJECT: DATA VALIDATION OF TOPPENISH NATIONAL GUARD PROJECT NO.

626121

On August 11, 12, and 13, 1992, water and soil samples were collected by Burlington Environmental personnel and submitted for analysis on August 14, 1992, to Sound Analytical Services. An analytical data review was performed on the following samples:

MW1-S1	MW1-S2	MW4-W1	MW4-W3
MW2-S1	MW2-S2	MW5-W1	MW5-W3
MW3-S1	MW3-S2	MW6-W1	MW6-W3
MW4-S1	MW4-S2	MW7-W1	MW7-W3
MW5-S1	MW5-S2	MW4-W2	MW4-W4
MW6-S1	MW6-S2	MW5-W2	MW5-W4
MW7-S1	MW7-S2	MW6-W2	MW6-W4
		MW7-W2	MW7-W4

Accurate chain-of-custody reports were included along with documented signatures from the field to laboratory receipt. All samples were shown as having been properly iced and received in good condition. Proper field sample control reports were included along with clearly written sampling methods, sampling depths, and the appropriate analytical requests.

Soil samples were documented as having WTPH-D or Method 6010 analysis. Water samples were documented as having Method 7421, Method 6010, Method WTPH-D or Method 8020 analysis. Holding times were clearly written and analyses performed within acceptable time frames per standard USEPA protocol.

Page 2
Memo from Nels Cone
Subject: Data Validation, Project 626121
September 10, 1992

Method blanks and laboratory duplicates demonstrated required data consistency. Calculated Relative Percent Differences (RPD) for all sample duplicates were well within established guidelines.

Chromatograms, along with external standard reports, were supplied for all WTPH-D analysis, indicating appropriate methods, instrument calibration times, and operator identification. Surrogate recoveries were within acceptable quality control (QC) limits for all samples and duplicates with the exception of samples MW3-S1, MW4-W1, and MW5-W1. Due to an elevated sample concentration of 9,900 mg/kg (diesel), the surrogate recovery value for MW3-S1 was diluted out during the repeat analysis. For samples MW4-W1 and MW5-W1, chromatograms clearly indicated the presence of diesel. Surrogate recovery for these samples was determined not to be within QC limits due to unspecified matrix interference. However, the values reported showed direct consistency with values reported from surrogate recoveries unaffected by matrix interference. In no way should these two specific data qualifications compromise the value of this data set.

Total lead analysis by ICP was performed on water all samples. Where a concentration was found to be lower than  $0.05 \text{ mg/}\ell$ , lead analysis by GFAA was conducted.

The parameters tested produced data with USEPA Contract Laboratory Program (CLP) recommended data qualifiers and values accurately displayed. Accordingly, the reported analytical data values are valid for all standard purposes.

APPENDIX F

Chain-of-Custody Records



BURLINGTON ENVIRONMENTAL Engineering

210 West Sand Bank Road P.O. Box 330 Columbia II. 62236-0330 618/281-5120 FAX

## CHAIN-OF-CUSTODY RECORD

6131 C.O.C. SERIAL NO.

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FAX (200) 767-3460

210 West Sand Bank Road P.O. Box 330 Columbia, IL 62236-0330 618/281-7173 618/281-5120 FAX

CHAIN-OF-CUSTODY RECORD

C.O.C. SERIAL NO. 6132

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W5-W2	8/13/92					2		X					7		"		
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W7-WL	8/13/92					2		N				170	Ж		"		
W4-W3	6/13/92					1			×		-		ע	Ж	"		
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BURLINGTON ENVIRONMENTAL ENGINEER'NG

210 West Sand Bank Road P.O. Box 330 Columbia, IL 62236-0330

CHAIN-OF-CUSTODY RECORD

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